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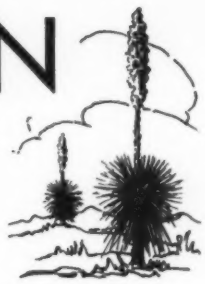

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Vol. XXV EL PASO, TEXAS, MAY, 1941 No. 5

Low Back Pain

*Relation to Organic Neurologic Causes**

RUPERT B. RANEY, M. D.
Hollywood, Calif.

THE term "low back pain" is one which is familiar to everyone in contact with the practice of medicine. Unfortunately it is not well defined and therefore, represents a bewildering number of underlying pathologic processes. Because of these varied and often obscure processes a careful analysis of the individual case with an attempt to classify it according to etiology has been somewhat neglected.

Earlier writers on the subject perhaps understood the character of the many types of low back pain better than is supposed today, even though very few pathologic causes were then known. Cotugni (1764) gave the first accurate description of low back pain of radicular origin. Valleix (1841) and Laségue (1864) added to the description in minute detail, and at present there is no better account obtainable of the symptom complex. They considered pain of a radicular nature a disease of the sciatic nerve when it emanated from the lower spinal segments, thus, the term sciatica was coined. "Sciatica" as described by these earlier writers, and, as should be implied, is therefore a radicular type of pain; i. e., it originated from involvement of one or more of the lower sensory spinal nerve roots. It is generally centered in the low back and radiates through the anatomic distribution of the spinal nerves involves.

When there is a better understanding of the character of pain which emanates from a specific lesion, then the differential diagnosis of low back pain will be much less confusing. In early medical history abdominal pain was not well understood, and was considered a general manifestation of intestinal disease. Later on, however, the character was analyzed and today we recognize the characteristic pain of cholelithiasis, acute appendicitis, nephrolithiasis, etc. Likewise, if a more thorough investigation of the character of low back pain is made our efforts will no doubt be rewarded; we will be able to recognize variations in type according to etiology which will help in a large measure to solve the problem of management. Steindler and Luck (1938) made an excellent contribution on low back pain which has shed considerable light on the subject, particularly in relation to injury to the fascia, tendons, and muscles about the lumbosacral and sacro-iliac joints. Therefore, emphasis here will be placed on low back pain emanating from organic neurologic processes.

When low back pain develops from pathologic involvement of the lower part of the spinal axis or its radicals sooner or later "sciatica" manifests itself. Unfortunately in the past low back pain with sciatic radiation was looked upon as a disease. However, with the present knowledge of causes for the symptom complex we no longer look upon it as a disease; instead we consider it a manifestation of disease with the actual cause situated, as a rule, about the lower third of the spinal canal.

It is interesting to note that earlier observers considered trauma a dominant factor in the production of low back pain with sciatic distribution, and that the trauma was often only trivial. Furthermore, they observed that the "disease" was more common among laboring classes, and that men were predominantly affected. By way of comparison these observations coincide strikingly with the more recent ones on patients suffering from what we now recognize as herniation of the nucleus pulposus; and there is little doubt that many of their patients suffered from the same condition. Tumors and chronic infections were occasionally recognized as being responsible for the syndrome but the cause in the majority of cases generally remained obscure. The French writers went so far as to state that syphilis was responsible for "sciatica" in ninety per cent of the cases. Even with the high incidence of syphilis in France their figures were undoubtedly far from correct.

RADICULAR PAIN

From a clinical point of view it is of importance to distinguish between low back pain of a true radicular nature and other nondescript types. In the former surgically removable lesions are often responsible while in the latter surgery is generally contraindicated. True radicular pain al-

* From the department of Neurosurgery of the University of Southern California School of Medicine.

Read before the New Mexico State Medical Association, May 28, 1940, at Albuquerque.

ways follows the anatomic distribution of the affected nerve. Since an abnormal discharge of painful impulses into the spinal cord through a single root may spread to several levels before integration to the level of consciousness, the involvement of only one root may, and frequently does, simulate involvement of several roots; still the boundries are within segmental limits. The pain may also vary considerably in character: (1) there is a common tendency to exacerbation and remission, (2) it is often exaggerated by an increase of intraspinal pressure, e. g., when straining at stool, coughing, sneezing, etc., and (3) temporary relief is not infrequently obtained by axial skeletal traction. In general, however, persistant or recurring pain radiating though the anatomic distribution of one or more spinal radicals of the lumbosacral plexus should strongly suggest a space-occupying lesion. In this group of cases intraspinal investigation by roentgenographic (lipiodol or air contrast media) studies is indicated.

In the non-radicular type of law back pain another large group of cases is encountered which may be classified under four general subdivisions: (1) those cases which result from regional organic disease in the skeletal structures, such as, trauma, myositis, arthritis, etc., (2) those resulting from constitutional disorders such as diabetes mellitus and avitaminosis, (3) referred pain from pelvic visceral disease, and (4) those that result from suggestion following trivial injury in the presence of minor psychotic states (hysteria, psychoneurosis). In the minor psychotic group the pain generally ignores segmental distribution. On the other hand, it must not be forgotten that "functional" complaints are frequently added to those of organic disease and, therefore, these cases should receive exceptionally careful consideration. Malingering has not been mentioned because it presents a legal rather than a medical problem, and furthermore, its recognition does not ordinarily offer great difficulty.

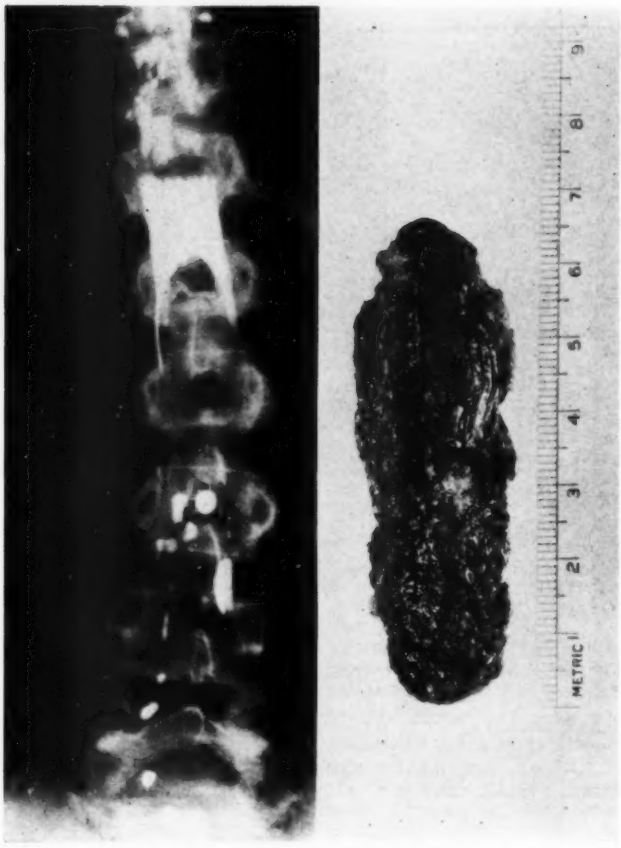
IDENTIFICATION OF CAUSE

Dorsal herniation of the nucleus pulposus with impingement on a spinal nerve root is one of the most common causes of "low back pain and sciatica", and positive neurologic signs are often conspicuously sparse. A few signs, however, can generally be found if a careful search is made. In these cases the history of back injury (frequently minor) with subsequent persisting or recurring pain of a radicular character is a strong indication of a space-occupying lesion. The exact site of such a lesion can finally be determined by roentgenographic contrast media study (see fig. 1).

Neoplasms about the spinal canal, either primary or metastatic, are also common causes of "low back pain and sciatica" frequently the distribution is bilateral) and here positive neurologic signs both visceral and somatic, eventually manifest themselves in abundance. Again contrast media is of advantage for localization purposes (see fig. 2). Of other causes which are occasionally encountered the history and findings are usually characteristic e. g., (1) acute spinal epidural abscess, (2) chronic granuloma secondary to tuberculoma caries of the lumbar vertebrae, (3) hemangioma of lumbar vertebra, (4) metastatic invasion of the lumbar paravertebral lymph nodes from malignant or infectious pelvic visceral disease. In the writer's experience syphilis not infrequently was found coincidentally, but on only one occasion did it contribute toward the production of symptoms.

If there is any question regarding the radicular character of the pain the presence of a space-occupying lesion is doubtful, and in such cases intraspinal injection of lipiodol should be withheld until more positive evidence of a space-

(Fig. 1): A.—Protruded portion of the nucleus pulposus removed at operation. B.—Fragments of ligamentum flavum. Arrow.—Spinal filling defect demonstrated with lipiodol showing involvement of nerve root.

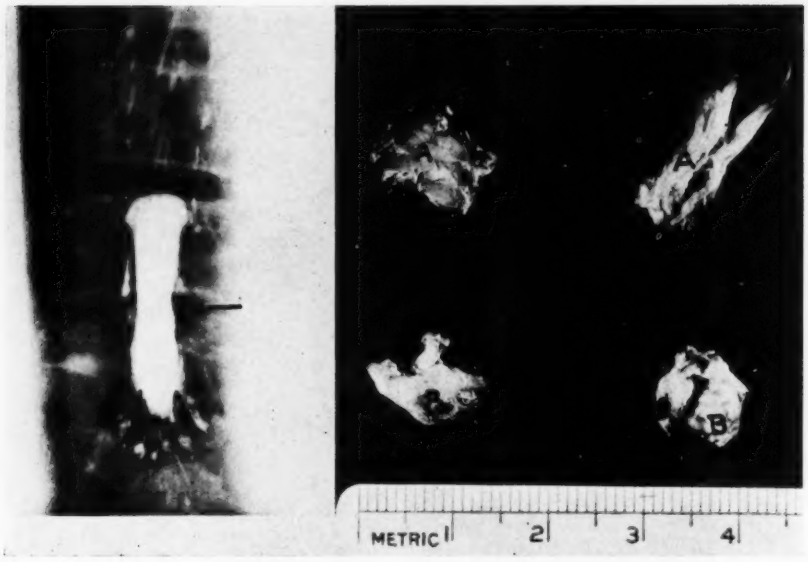


(Fig. 2): Accurate localization of neoplasm with lipiodol. Neoplasm on the right removed at operation (ependymoma).

be almost complete before any material rise in the total protein occurs. After these preliminary studies have been completed and a space-occupying lesion appears to be present, roentgenographic studies with contrast media are in order and of the utmost importance. Air and lipiodol are the media usually employed.

The writer prefers the use of air in certain cases where the presence of a space-occupying lesion is doubtful. However, it is not generally practical and ordinarily is valueless unless rigid technique is employed under optimum conditions. Furthermore, correct interpretation of the films requires pessions may be gained. Similar precautions may occupying lesion develops. Moreover, in these cases psychoneurosis is often an etiological factor, and if an organic lesion is not present the mere knowledge that lipiodol is in the spinal canal may be sufficient to cause a marked exacerbation of symptoms. Consequently a careful history and examination is essential and is sufficient ordinarily to at least strongly indicate the cause for the pain. After this has been done and it appears that a space-occupying lesion is present, then a thorough intraspinal study is indicated.

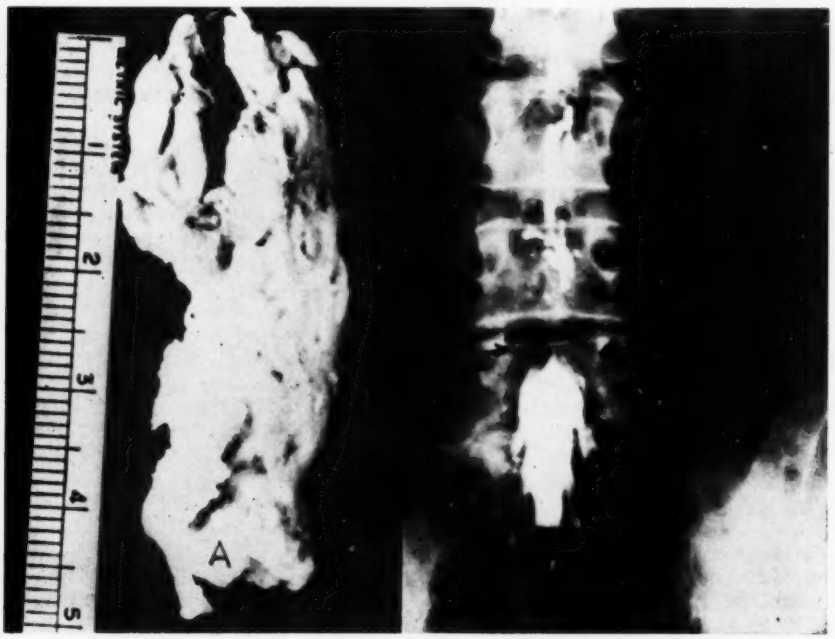
The reaction of spinal fluid to jugular compression (Queckenstedt's test) is commonly employed in differentiating space-occupying lesions from other lesions. Therefore, it should be emphasized here that a negative Queckenstedt's sign does not rule out the presence of a space-occupying lesion. In fact the only significance of a positive Queckenstedt's sign is that the lesion has reached a far advanced stage causing a complete subarachnoid block. Slight increase in the total protein of the spinal fluid is suggestive of a partial obstructive lesion; however, it must not be forgotten that occasionally spinal obstruction may be added with regard to the use of lipiodol. The patient should be in a prone position, the lipiodol should be allowed to travel slowly en masse along the spinal canal studying under the fluoroscope each vertebral segment as it passes. When a deformity in the canal is seen a "spot film" should be instantly taken; otherwise, small lesions (see fig. 3) will be entirely missed. On the other hand, if the lipiodol is allowed to string along the canal during study very little if any information will be



(Fig. 3): Arrows indicate bilateral filling defect in the spinal canal. A.—Fragments of ligamentum flavum. B.—Protruded portions of nucleus pulposus causing filling defects and responsible for bilateral sciatica.

obtained. In the case of a large lesion where obstruction is complete no difficulty is encountered (see fig. 4).

Although air is preferred it has certain disadvantakes, i. e., slight variations in x-ray technique may fail to give a satisfactory shadow. On the other hand lipiodol gives a perfect shadow at all times but is objected to on the grounds that it is irritating to the spinal nerve roots. This objection, however, need not be of concern if the lipiodol is used primarily for localization in properly selected cases, since it can be removed later at operation for correction of the condition. The writer has had no bad experiences from its use



(Fig. 4): A.—Large dislocated nucleus pulposus removed at operation. Arrows indicate level of almost complete spinal obstruction and narrowing of fourth lumbar interspace.

although they have occasionally been reported. Usually bad experiences reported have been with psychoneurotic patients whose pain was not of a true radicular type, or whose pain was due to an acute infectious process. In these cases the etiology should not be confusing and such patients are obviously not candidates for lipiodol injection.

When the diagnosis of a space-occupying lesion has been established surgery is indicated. If considerable congestion is found in the affected nerve roots, section of the sensory divisions should be done; otherwise, radicular pain may persist indefinitely consequent to cicitricial changes occurring in the reparative process even though the primary cause has been removed.

6650 Franklin Ave.

DISCUSSION

By D. F. MONACO, M. D., Gallup, New Mexico

I can fully appreciate Dr. Raney's position in presenting such a difficult subject in the time allotted him. I must say that he has brought forth some very enlightening facts.

There is no question but that low back pain, and chronic recurring sciatica are perplexing symptoms, frequently encountered by the general practitioner, and the orthopedic surgeon. It was not until x-ray studies of the spinal column were made, following the introduction of radiopaque oils and airs, that the neurologist and neurologic surgeon fully realized the frequency with which space-occupying lesions and ruptures occurred in the intervertebral disks, and that they were responsible for recurring sciatica.

As has been pointed out, this symptom complex must not be looked upon as a disease but must be considered as a manifestation of disease located somewhere about the lower third of the spinal canal.

For some reason or other, the average practitioner, when confronted with a case of low back pain, throws up his hands in despair, and I don't blame him. As to causes, one could approach the subject from the orthopedic, the gynecologic, and the neurologic standpoints. When you consider the number of conditions that produce low back pain, it is no wonder that these cases drift from one man to another for relief.

Dr. Raney has struck the key, when he states that it is of importance to distinguish between low back pain of a true radicular nature, and the other nondescript types. Surgery is of great benefit in the radicular types, and as a rule, contra-indicated in the nondescript types.

As a point of clarification, it might be stated that radicular pain is a nerve root pain, especially that portion of the root lying between the spinal cord and the inter vertebral canal is involved. If one keps this in mind, then the symptom complex is understandable.

The characteristics of nerve root pain should be remembered:

(1) Common tendency to exacerbation and remission.

(2) Exaggeration by an increase of intra spinal pressure.

(3) Temporary relief at times by axial skeletal traction.

In the past 5 or 6 years our attention has been called to the frequency of dorsal herniation of the nucleus polposus with impingement on a spinal nerve root as one of the most common causes of low back pain and sciatica. In 1934, Mixter and Barr made a review of their own cases and stressed the etiologic significance. Prior to this time, the lesions had been referred to as "fibrochondromatous masses", and "ecchondroses" of the spinal column. Goldthwait is accredited with first suggesting that injuries to the intervertebral disks might be responsible, and were a cause of lumbago and sciatica.

The disks are fibro-cartillaginous and are interposed between the adjacent surfaces of the bodies of the vertebrae. Their size is greatest in the lumbar region. The disks form about a fourth of the vertebral column. The outer portion of the disk is composed of many layers of fibrous connective tissue and this enveloping tissue is called the "annulus fibrosus". The central portion of the disk is composed of soft, pulpy, highly elastic fibrocartilage, yellowish in color, and is called the "neucleus pulposus". This pulpy substance is well developed in the lumbar region, and contains a small synovial cavity in its center. The intervertebral disks are considered shock absorbers and the nucleus pulposus likened to a hydrodynamic ballbearing with a certain limited excursion. Each time we flex our spines, these ball bearings go backwards a little and get out of the way. Every time we bend backwards they come forward a little. In certain quick or twisting movements these ball bearings get pinched and rupture.

Most of the injuries to a disk take place in the flexible portion of the spinal column, above a part that is not flexible. This is true, since the greatest number of injuries occur btween the 4th and 5th lumbar, 5th lumbar and 1st sacral vertebrae, and in lower cervical regions. Repeated injuries and acute flexion of the movable portion of the spinal column on a fixed portion are capable of tearing sufficient number of fibers in the annulus fibrosus to allow prolapse of the nucleus pulposus through the injured portion of the annulus. When this occurs, the nucleus may either partially or completely prolapse into the spinal canal. The small protrusions which mildly compress the nerve roots against the peduncle frequently disappear when the spine is extended or when the direction of the axis of the spine is changed. This explains why temporary relief is obtained by rest in bed and traction, and also explains why a protruded disk sometimes is not found at operation. Patients who have this type of lesion are the ones who obtain relief from bony fixation. The more extensive protrusions and prolapse of the nucleus polposus produce more or less constant pressure on the lumbar nerves and likewise persistent sciatic pain, with a listing of the thorax away from the painful side.

The non radicular type of low back pain comprises a very large group in which the causes are many. In order to locate the cause of low back pain whether of the radicular or th enon-radicular type, it seems to me that one has to have a fair knowledge of the general field of medicine. In order to facilitate matters, I would suggest this method of approach.

(1) A careful, meticulous history.
(2) General examination.
(3) Complete pelvic examination.
(4) Orthopedic examination especially of the sacro-iliacs and lumbrosacral joints.
(5) A neurologic examination and whatever tests are suggested.

I wish to commend Dr. Raney for his able presentation and for the valuable information which he has brought to our attention.

Craniocerebral Injury

J. RUDOLPH JAEGER, M. D.
Denver, Colorado

IN this presentation I shall attempt to refrain from discussing injuries to the scalp, skull, and brain along the usual didactic, textbook lines, and shall strive to emphasize the general principles of treating head injuries as learned through experience in the management of the various problems of intracranial disorders as encountered by the neurosurgeon.

In the first evaluation of the seriousness of a head injury, a consideration of the state of the patient's mental reaction is of paramount importance. It makes little difference how massive the injury may be—if he knows "who he is", "where he is", and "when it is"—there is not apt to be a serious brain injury. If potentially serious, then appropriate treatment most certainly will prevent any hazardous complications. On the other hand, the patient who is disoriented, delirious, stuporous, or in coma is very apt to be in a serious condition, and skilful judgment may be necessary for instituting proper treatment, or what is more important, the prevention of unnecessary, meddlesome treatment which may do harm.

TYPES OF HEAD INJURIES

With this one great criterion of the immediate seriousness of all head disorders in mind, it is possible to classify our head injury patients, for the purpose of treatment, into four general groups:

Group 1: Head trauma without shock or mental disturbance.

It is obvious that these patients may have gross injuries such as lacerations of the scalp, fracture of the skull, laceration of the brain with muscular paralysis, middle meningeal hemorrhage or a subdural hematoma. But in this group a thorough examination and appropriate treatment can be instituted without delay or risk. This group includes the majority of the cases of head injury, many of whom require no care other than careful observation over a reasonable period of time. As an example of this type of case may I cite the following:

A male child fourteen months of age fell through a clothes chute head first onto a concrete basement floor, a distance of approximately eight feet. He was stunned for a few seconds, but soon began to cry lustily. Following this he was irritable but at no time showed signs of irrationality, stupor, or coma. X-ray examination showed a huge simple fracture of the skull passing entirely across the head from ear to ear. Nothing in the way of active treatment was ordered except instruction for frequent observations of the child's mental reaction. He made an uneventful recovery without signs or symptoms of brain injury.

Group 2: Head injury with delayed disturbance of mentality.

When patients in group 1, with normal mental reactions immediately after injury, show either confusion, delirium, stupor, or coma—and it must be noted that a patient passing from full consciousness to death passes through these various states—then it is necessary to make a differential diagnosis between subdural hematoma, middle meningeal hemorrhage, delayed cerebral edema, or fat emboli.

Group 3: Craniocerebral injury with immediate shock or mental disturbance or both.

This group of cases show either confusion, delirium, stupor, or coma at once, often but not necessarily complicated by shock. The underlying pathology may be profound or entirely absent as found in simple concussion.

The physician's first concern here is the treatment of the shock so that appropriate surgical treatment, if needed, can be instituted. All activity toward treating the intracranial disorder need not be considered until the patient is a good operative risk. Blood transfusion is the best method of combatting shock. Intravenous salt solution is next best, but may be more practicable because of immediate availability. Morphine should be given only to patients actually in pain. Stuporous patients in shock may be harmed by this drug. X-ray of the skull, unnecessary detailed examination, and spinal puncture are to be withheld until the patient is out of shock. Those patients in coma, with a fast pulse, edema of the lungs, extremely high or low blood pressure and—more important—a fast respiratory rate, are not fit subjects for surgical treatment of any type.

Group 4: Late sequelae of craniocerebral injury.

This group includes the chronic subdural hematoma which so often gives no indication of its presence other than a persistent headache following a blow to the skull. It may be differentiated from the equally common post-traumatic headache (which is probably a traumatic neuralgia of the middle meningeal nerve to the dura) with considerable difficulty, and usually only after diagnostic encephalography, ventriculography, or subdural exploration through trephine openings.

Old depressed fractures and large bone defects in the skull which need surgical treatment fall into this group.

Much more difficult problems as to the possibility of effecting a cure are those of chronic mental changes following head injury, i. e., post-traumatic psychoneuroses or actual degenerative psychoses.

TREATMENT

Any rational treatment of a head injury must be based on the underlying pathology to be treat-

Presented before the New Mexico State Medical Society, May 28 1940.

ed. Therefore the following clinical problems present themselves:

1. Simple injury to scalp, skull, and brain, without shock or mental disturbance.

A. Laceration of the scalp. This is the very commonest injury to the head, therefore the most important problem in the treatment of these traumatic disorders. Neglect in the proper treatment of a scalp wound may be, and all too often is, the cause of serious complications. I cannot too strongly impress upon you the possible terrible consequence of improper care of the simple scalp wound. As an example, I cite the following case:

A male infant nine months of age was brought to his family physician for the treatment of a punctate laceration of the scalp about one-half centimeter in diameter, of two weeks' standing. The child was suffering from fever and headache, and a purulent exudate was running from the wound. Roentgenograms disclosed a depressed fracture of the skull, one centimeter in diameter, and the attending physician rightly suspected a brain abscess. The fracture site was opened and a huge abscess in the cerebral hemisphere drained. Unfortunately the child died five days later from a spreading meningitis.

With proper, immediate treatment of this wound, there would have been no danger whatsoever from infection.

All scalp wounds must be thoroughly cleansed by shaving a large area around the wound. The surgeon must learn to pay little attention to preserving the hair at the expense of cleanliness. A thorough washing of the wound and swabbing with iodine into its depth is imperative in every case.

If the wound is macerated or the skull fractured beneath it, then the damaged contaminated tissues must be cleanly excised.

If the patient is uncooperative or the procedure apt to be painful, then one should not hesitate to give a general anesthetic. The surgeon must not handicap himself with a haphazard attempt at carrying the operation out under impossible conditions.

B. Fracture of the skull. Compounded wounds should have all depressed fragments of skull raised and those loose should be removed and discarded. All depressed fractures and particularly the "green-stick" fracture of infants should be elevated as soon as the condition of the patient permits. (See Fig. 1.)

C. Laceration of the dura and brain associated with a compound fracture should be adequately explored, all bone, dirt fragments, macerated brain, and blood clot removed with suction followed by body temperature saline irrigations. The dura necessarily must often be left open. The galae should be sutured with No. 00 chromic catgut. Drainage is unnecessary if the wound has been promptly and properly cleansed.

D. Cerebrospinal fluid leak. This may take place where the subarachnoid space has been opened by a fracture line through the sinuses or mastoid. And because these cavities usually harbor pathogenic organisms, meningitis or intracranial abscess occurs in a high percentage of these cases. If the fluid escape is marked, indicating a large communication, the fracture line should be closed by stripping the dura from the roof of the ethmoid, frontal sinus, or mastoid, and plugging the hole with a piece of fascia and blood clot. X-rays of the skull will show the probable site of the leak. Certainly this should be undertaken only by one skilled in neurosurgery.

Fractures passing the middle ear with rupture of the drum should be treated by thorough irrigation of the external auditory meatus and drum twice daily with a 2% aqueous solution of mercurochrome. Fractures in this same location often cause delayed paralysis of the face. The facial weakness becomes manifest from two to ten days after the injury and is caused by traumatic edema in the facial canal. It always recovers promptly and requires no treatment.

E. Intracranial infection (abscess or menin-

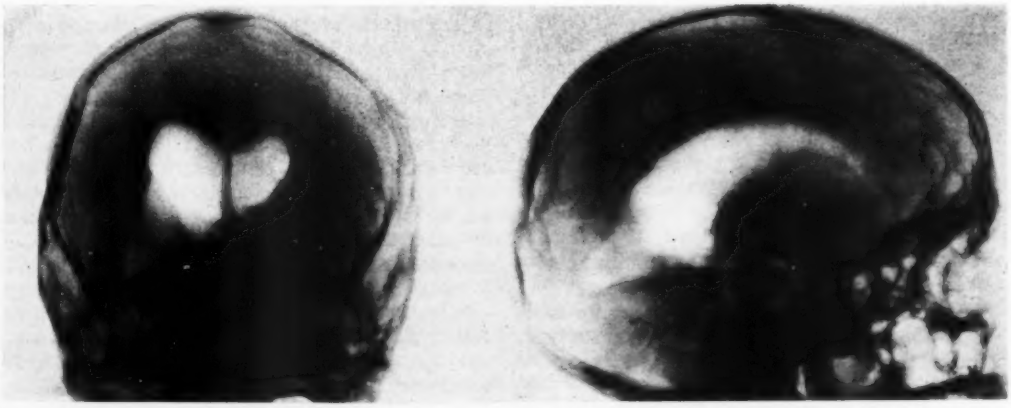


Fig. 1. Showing effect of old depressed fracture of skull on the brain. Fracture occurred at birth. At 28 years of age the brain shows marked atrophy (more on the side of the fracture) by ventriculography.

gitis) will complicate skull injury in infected skull wounds or where the mastoid or sinuses are opened. Headache, rigidity of neck, choked disc, and fever indicate extension of the infection into the cranial cavity. Sulfanilamide should be given to prevent such infection where contamination may be expected.

The treatment of meningitis is that common to the treatment of any pyogenic intracranial infection.

An abscess must be opened and drained, but not until the acute reaction surrounding it has subsided, which usually takes about three weeks following the probable date of infection.

2. Concussion is a term that must be reserved for temporary lapses of consciousness lasting not more than a few minutes at the most. Long periods of confusion or loss of consciousness most certainly indicate pathological changes in the brain tissue or pressure from a blood clot. It is apparent then that a long period of abnormal mental state indicates intracranial damage and treatment must be instituted accordingly.

3. Diffuse brain damage.

A. Multiple hemorrhages ranging in size from one millimeter to two centimeters may be diffusely scattered through the brain substance. If these are few there may be no clinical manifestation of brain disorder. These are the lesions of the prize fighter who eventually becomes "punch drunk" from repeated small hemorrhages which cause brain destruction on scarring. If the lesions are many the patient will be proportionately ill, and if he survives there may be an incurable psychosis following. Death is usually preceded by an initial delirium which passes into stupor and coma, with fever, fast pulse, and fast respiration. Conservative treatment is indicated in these cases, but no matter what the treatment, diffuse permanent damage to the brain will result, the extent depending on the initial brain damage caused by the hemorrhages. The post mortem brain in many of these patients who live for several weeks resembles a piece of swiss cheese, it is so permeated with hemorrhagic cavities.

B. Edema of the brain rarely occurs without multiple hemorrhages or extensive laceration of the brain tissue. Very occasionally one may see it as a superimposed phenomenon late in a prolonged illness from head injury or other disease. Then it occurs probably as a reaction due to a disturbance in tissue metabolism, and quite likely incident to faulty protein metabilism. Uncomplicated brain edema from a head injury is extremely rare, and from the standpoint of practical treatment need not be considered.

C. Fat emboli occur as a complication to fractures of the long bones and pelvis, particularly in fractures in the lower extremities. They show their presence in the brain by fever, fast pulse, confusion, delirium, stupor, coma, and death. The onset is in a perfectly rational patient, three to five days after the injury, and the condition practically always ends fatally.

4. Massive hemorrhages inside the skull.

A. Large localized hemorrhages in the brain substance may give no evidence of themselves unless they occur in some vital center such as the motor area or visual center. A paralysis or homonymous hemianopsia occurring suddenly in a person following a head injury indicates a sizable blood clot embedded in the brain substance. Frequently the clot will break through the cortex into the subdural space and is complicated by a huge subdural clot. The patient should have an immediate exploratory craniotomy over the affected area. By evacuating the clot almost complete recovery of function can be anticipated. If left alone grave functional disturbances will remain. Prompt surgical treatment is particularly important where the clot is near the speech center. On a number of occasions I have had a complete return of speech after removing a clot from the left motor center of a speechless person.

B. Subdural clots from between the arachnoid covering of the brain and the dura and come from bleeding from a torn cortical vein. (See Fig. 2.) When the vein is ruptured it continues to bleed until the intracranial pressure exceeds the intravenous pressure. Then the blood clots, closing the rupture in the vein. It probably takes from 15 minutes to an hour for the hemorrhage to stop, and it is unlikely that a recurrence of the bleeding takes place from the same point. Once the blood is in the subdural space, it is not absorbed as blood is in other parts of the body. In fact, it gets larger by absorbing cerebrospinal fluid, thereby increasing its volume. There is also evidence to make one believe that the primary hemorrhage causes ruptures to occur in other cortical vessels, giving rise to secondary hemorrhages about the initial one.

Chronic headache following a trivial or severe head injury makes one suspect a subdural clot. The history, immediately following the injury, of a severe headache coming on hours after the blow, with nausea, vomiting, and shock, is suggestive. Often the headache subsides to recur several months later. A dilated pupil on the side of the lesion frequently occurs, and a hemiparesis does occur but is uncommon. If the clot remains for any length of time, it becomes encapsulated. This may be seen starting even as early as ten days after the accident. In a month's time the capsule will be well developed, and as time passes it thickens to much the same appearance as a gall bladder wall. Its blood clot interior also becomes degenerated into a fluid consistency much like bile.

These clots frequently envelop an entire hemisphere, indeed the blood may pass beneath the falx so as to form a huge hematoma on the opposite side from the original hematoma. If treated soon after the hemorrhage occurs and before encapsulation, the clot can be evacuated by suction. When it becomes encapsulated, it may be

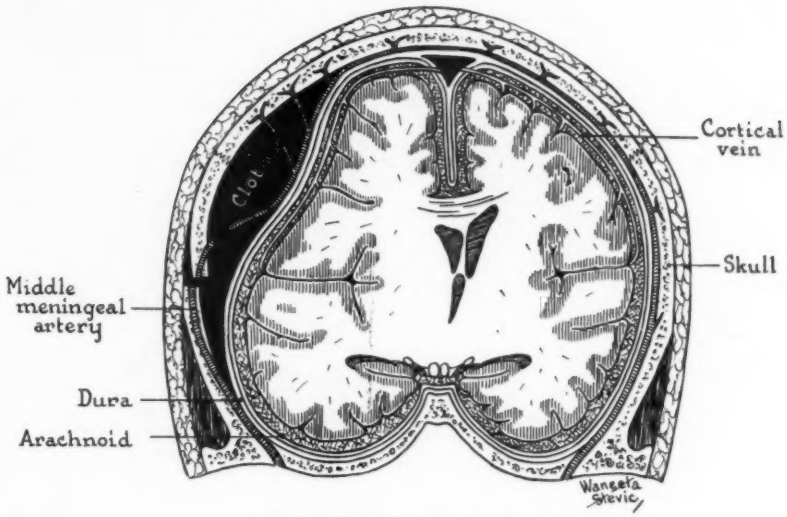


Fig. 2. Hemorrhage from middle meningeal artery is placed between dura and skull and continues to enlarge by tearing more small vessels as it enlarges.

temporarily emptied by making a tiny opening through the skull, dura, and capsule, but a permanent, complete cure can be expected only after an extensive cranial opening has been made and every part of the capsule removed.

C. Middle meningeal artery hemorrhages are always caused by a fracture through the squamous portion of the temporal bone. Anatomically this vessel is embedded in a channel in this bone, and many times it even tunnels through the bone for a short distance. When the bone is fractured the broken edges shear the vessel through. The bleeding always takes place between the dura and the bone. The arterial pressure gradually strips the dura from the bone and in so doing it tears additional vessels which pass from the dura into the skull. This process continues until the dura may be stripped from the entire side of the skull. (See Fig. 3.)

Hemorrhage of this type is suspected when a person with a head injury complains of headache which is followed in a few hours of the injury by weakness of the face on the opposite side, then by weakness of the arm. When the hemorrhages reach sufficient size, the patient becomes confused and stuporous, the pulse slow, and the leg may become paretic. If it occurs on the left side there is very early a disturbance of speech. Roentgenograms which show a fracture line through the middle meningeal artery channel will clinch the diagnosis.

Occasionally the patient complains only of persistent headache, and on one occasion I unexpectedly ran into a middle meningeal hemorrhage when I had suspected a tumor of the brain.

Middle meningeal hemorrhage if not surgically treated almost always ends fatally but not necessarily so. If the patient should survive there is often left a very disabling hemiparesis. Promptly treated a complete cure can be expected in every case.

The skull must be opened adequately to evacuate the clot completely, and the bleeding points coagulated. No single ligature will control the bleeding, as it will be found that the hemorrhage comes from many tiny torn arteries. The operation is best carried out through a small bone flap which will give thorough access to the hemorrhage and leave no bone defect in the skull. It can be controlled by rongeuring out a hole in front and above the ear about two inches in diameter. If the patient is very ill this is the procedure of choice, although not so good as the bone flap exposure. The bleeding points may be controlled by lightly packing between the dura and skull with gauze. This should be partially removed in twenty-four hours and completely removed in forty-eight hours.

In many instances there will be a large quantity of subdural fluid beneath the clot, and this should be removed by making a small opening through the dura. Often this fluid accumulation is doing as much harm as the extra-dural hematoma.

Subarachnoid hemorrhege occurs where veins entirely in the subarachnoid space are ruptured. This bleeding floods the entire fluid-bearing spaces inside and outside the brain and in the spinal canal. It may be a complication of injury to the skull, and therefore only a part of the picture of the injury. Simple subarachnoid hemorrhage gives rise to headache and slow pulse but no lo-

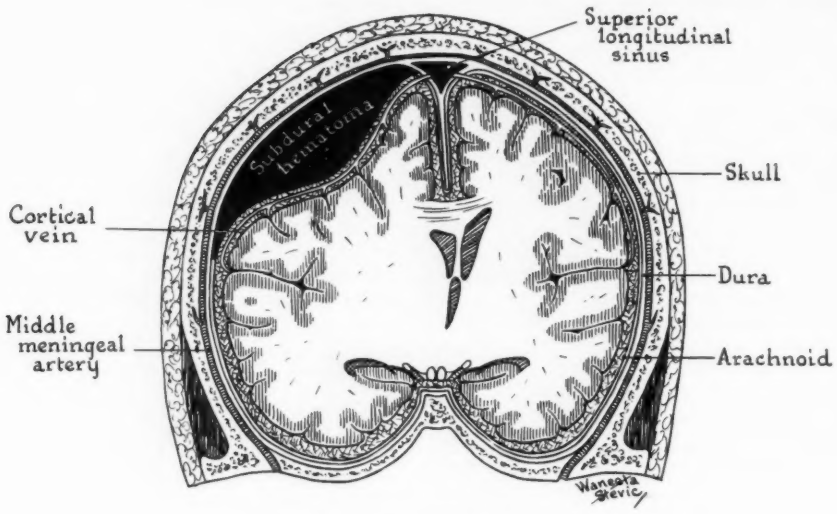


Fig. 3. Subdural hemorrhage occurs between the dura and the arachnoid covering of the brain. The bleeding comes from a ruptured cortical vein.

calizing signs. This is one location from which blood can be removed from the cranial cavity by spinal puncture. Very bloody cerebrospinal fluid is poorly absorbed from the subarachnoid space and causes hydrocephalus with pressure signs. Its removal by repeated puncture is desirable.

5. Late sequelae of craniocerebral injury.

A. Chronic headache following head injuries (post traumatic headache) is a frequent occurrence and is usually associated with a fracture of the skull. It is difficult to differentiate it from chronic subdural hematoma. This is usually done by air injection inside the skull or by exploratory trephine openings. In addition to the headache the patient is likely to suffer from nervous exhaustion and irritability which is the direct result of constant discomfort.

The underlying pathology is probably a traumatic neuralgia of the meningeal nerve supply; most often of the middle meningeal nerve, which follows the middle meningeal artery, as it covers the dura. This nerve enters the skull through the foramen spinosum and is the sensory nerve supply to the greater part of the dura.

In the early stages of a post traumatic headache (first three or four months) it can often be cured by encephalography. Just what action the air has on stopping this headache is unknown. When the headache becomes chronic then the only cure is by cutting the middle meningeal nerve at the foramen spinosum. It is necessary to cut the middle meningeal artery with the nerve and plug the foramen with a bone peg to prevent regeneration of the nerve. This procedure is simple and effective in a great percentage of post traumatic headaches and leaves no undesirable effect.

B. Post traumatic psychoneurosis is an intangible clinical entity characterized by a multiplicity of changing complaints in a patient following a head injury without objective signs of disease. It is usually more marked in persons who had an unstable nervous system makeup prior to the injury, but may develop in one who has been of very stable personality. It runs a chronic course and there is no specific treatment for it.

C. Post traumatic psychosis is an actual mental deterioration due to pathological changes in the brain due to trauma. Shrinking of the brain substance is usually obvious in pneumoencephalography. Disorientation, loss of memory, and disintegration of the personality are common in advanced cases, while milder personality changes as defective judgment, personal untidiness, facetiousness, or irritability may be all that is noticed in milder cases. Treatment can be of no avail in this disorder.

GENERAL PRINCIPLES

1. X-ray examination of the skull. Roentgenograms of the skull are indispensable when arriving at an accurate diagnosis in most instances of head injury. It is seldom indicated, however, when the patient is in shock. Inasmuch as the procedure is a diagnostic one, it is always wise to treat the shock, leaving the x-ray examination to such a time as the patient's condition may permit moving. The x-rays should be taken to determine whether or not there is a fracture line through the skull which passes through the channel of the middle meningeal artery. If it does, in all probability there has been hemorrhage from this vessel. It will also show whether or not there is a depressed fracture or if there are fragments driv-

en into the brain. If there is a calcified pineal body, and it is precisely in the midline, there is likely to be no huge space occupying lesion to the right or left of the midline, which in many instances helps exclude a large subdural hematoma. It is more important when the calcified pineal is deviated to one side or the other. Then one can be quite sure that a surgical lesion exists in the cerebral hemisphere from which pressure has been exerted on the midline structures. Oftentimes if there are no localizing signs of a huge intracranial hemorrhage, this simple finding will clarify the location of the lesion. With a fracture line passing downward through the squamous portion of the petrous bone into the region of the internal and external auditory meati, one can anticipate a delayed facial paralysis in many instances. We can also be sure that this paralysis will entirely clear up. Fracture lines passing through the middle ear or through the sinuses also warn one of the danger of cerebrospinal fluid leak, and of the possibility of a pyogenic meningitis developing.

2. Tetanus and gas bacillus antitoxin. With any badly contaminated wound, particularly where the accident has occurred on a roadway, it is well to give prophylactic doses of both tetanus and gas bacillus serum. One should not expect these sera, however, to give full protection against these organisms if the wound has not been thoroughly cleansed. The proper care of the wound is much more important than the giving of the serum. It is well to give the prophylactic dose, and then twelve hours later give a second prophytactic dose of a different manufacturer, to be sure that the material is potent.

3. Sedation. Morphine is to be avoided for the purpose of keeping patients quiet following head injury. The newer amytal drugs are probably the safest to give. Sometimes it is necessary to give large doses of sodium amytal intravenously to control the patient. If this fails, then codeine should be used, but in moderate doses. Even with huge doses of sedatives, at times it is impossible to control the delirium of an acute brain injury. In these instances it is necessary to use physical restraint. Morphine should never be given to a patient who is not in pain. It is not permissible to give it for the treatment of shock, except where the patient is suffering.

4. Dehydration. Up until the last few years it was quite popular to dehydrate almost every head injury to the point where the general body metabolism was completely wrecked. We know now that it is much more important to keep up the general body resistance by giving a sufficient quantity of fluid to take care of metabolic needs. Excessive quantities of fluids should not be administered, but certainly up to 1500 c.c. per day should be given in the case of most head injuries. If dehydration is desirable, then one can get this effect from merely withdrawing the fluid intake. Dehydration by intravenous salt solutions and hypertonic sugar solutions has almost disappeared from the armamentarium of the neurosurgeon in the treatment of head injuries. Glucose in physiological concentration is desirable as a food, but 50% glucose probably acts as a direct tissue irritant to the already inflamed, contused brain tissue. It is my belief that frequent small blood transfusions are of distinct benefit in the post traumatic state.

5. Dressing of the head. It is important, as already pointed out, to cleanse thoroughly a large area around the site of injury. It is just as important that this area be kept permanently clean until the wound is well healed. This can be done only by securing the head dressing on the head in such a way that it will not be dislodged. This can be done by incorporating both ears in the dressing and running part of the bandage beneath the chin, followed by adequately securing the dressing with many pieces of adhesive plaster. This is particularly important where the patient is uncooperative and pulling at the bandage.

6. Nursing care of the patient. In the observation of the patient with a head injury, the important thing is the state of the patient's consciousness. It is much more important for the nurse to note that the patient is alert mentally, or, if the patient has been disturbed, that he has not passed on into a state of semiconsciousness or profound stupor than to be occupied with the taking of the blood pressure every fifteen minutes or half hour. It is strange how often one finds that a nurse believes that it is natural for a patient who has sustained a brain injury to become unconscious and stay that way, and they therefore are not particularly excited about this serious condition. As a general principle it is always best to have the patient's head slightly higher than the body. In this position the drainage of the edematous tissues is favored rather than retarded. It is a matter of common experience to see an extremity which has been traumatized swell because it is held dependent. When elevated the swelling will promptly disappear. We also know as a matter of common experience that an inflamed extremity, if held down, will be exceedingly painful, where if it is elevated, the pain entirely disappears. The same principle applies in treating edema of the brain due to injury. The intracranial pressure is also much less when the patient's head is up than when it is flat or below the level of the body. This is because the venous blood flows more readily out of the skull when it is elevated than when it is low. Again there is less liklihood of secondary hemorrhage when the head is up rather than down. The unconscious person should be given adequate food to maintain normal metabolism through a nasal tube into the stomach. If the patient does not swallow readily, then no food should be given by mouth.

A stuporous patient with shallow respiration is apt to collect mucous in the bronchial tubes and in the dependent portions of the lungs. Retained mucous should be a signal for evacuation of this

material by an intratracheal catheter. Dyspnoea and a rapid respiration frequently are indicators of retained secretion in the bronchial tubes. The anoxemia due to poor aeration of the lungs will prolong the stupor that might have been started by injury to the brain.

7. Spinal puncture. Examination of the spinal fluid by a spinal puncture is invaluable from the standpoint of gaining diagnostic knowledge of the case. It is less important as a therapeutic measure. It is to be used only where there is an abnormal accumulation of fluid in the subarachnoid space, in other words, where there is a post traumatic hydrocephalus. This condition is frequently found where there is an abundance of blood in the cerebrospinal fluid-bearing spaces. This changes the normal consistency of the fluid so that it is poorly absorbed through the cranial lymphatics. In order to decrease the intracranial pressure, one may remove it with a spinal puncture needle without hazard to the patient. On the other hand, one must be quite certain that there is no large clot inside the cranial cavity that is causing the increased pressure. Extradural or intradural hemorrhages cannot be removed by spinal puncture, inasmuch as these hemorrhages do not communicate wiwth the subarachnoid space of the brain. A spinal puncture should not be done without measuring the intracranial pressure. In this way one can decide as to whether or not subsequent punctures will be necessary. Spinal puncture cannot and will not reduce tissue edema. It merely removes excess cerebrospinal fluid.

8. Decompression operations. This operative procedure has almost entirely fallen into disuse. It is still to be reserved, however, for those occasional cases of general swelling of the brain where there is need for additional room because of the increased volume of the brain. In my own experience, I have performed this operation less than a half dozen times. Sometimes a small decompression left over the top of a traumatized area of brain may protect the remaining portion of the cerebral hemispheres from a prolonged pressure effect.

9. Exploratory trephine openings. This is an operative procedure which is invaluable in the surgical treatment of head injuries. By making tiny openings through the skull, not more than a half inch in diameter, one can thoroughly inspect the extradural and the subdural spaces. If there is a middle meningeal or subdural hemorrhage, it will be quite evident through such a small opening. It can be made without shock to the patient, under local anesthesia, and usually requires not more than fifteen minutes for exploration of both sides. Oftentimes it is entirely impossible to arrive at an accurate diagnosis of the case without making these harmless openings through the skull. They are always made over the outer convexity of the skull, at about the middle of the head.

CONCLUSIONS

1. The state of the patient's consciousness is the most important guide as to the seriousness of a head injury.

2. Shock is of primary importance from the standpoint of treatment, and all treatment other than that for the shock is to be delayed until the patient has recovered from it.

3. There is no one type or plan of treatment that fits all cases of brain injury, and treatment must be based on an accurate diagnosis of the underlying pathology in each given case.

4. The immediate, proper treatment of compound wounds of the skull is the great problem in general practice.

5. Bilateral exploratory trephine openings are necessary for arriving at a correct diagnosis in many cases of head injury.

1612 Tremont Place.

Treatment of Acute Respiratory Infections with Oral Coryza Antigen

Preliminary Report

MAXWELL R. PALMER, M. D.
and
JEROME E. ANDES, Ph. D., M. D.
Tucson, Arizona

THE question of the value of coryza antigen or "cold vaccines" is such a mooted one that one hesitates any lengthy discussion of the problem. In regard to parenteral administration (vaccine), the concensus of opinion seems to be that a satisfactory degree of immunity to acute respiratory infections is produced in at least a small percentage of cases. The results reported vary from those very enthusiastic about the success of the vaccine, to others who report absolutely no success whatever.

With the oral route of administration there is even more skepticism. This critical attitude is justified when one considers that the essential element in the vaccine (bodies of micro-organisms or protein extracts of the same) is protein in nature and therefore subject to digestion in the gastrointestinal tract before being absorbed (presumably as amino acids). However, Murat's[1] studies (carried out on 1,278 individuals over a periods of 2 years) noted a definite though small decrease in the amount of time lost among those taking the oral antigen tablets as contrasted with the group taking a similar tablet containing only lactose. Stafford,[2] using uni-

From the Department of Health, University of Arizona.

versity students (325 with vaccine and 224 as controls) noted a three-fold decrease in the number of colds and a two-fold decrease in the time lost because of colds, in the group taking the oral immunization tablets. With severe colds the dissimilarity was even more striking. There were nearly six times as many severe colds in the control group as in the treated group; likewise, the untreated students were ill about six times as many days.

Piccoli[3] has published two papers on this subject. In 1938 he found a reduction of about 50% in a group of patients taking oral vaccine, as compared with the controls; also the colds in the treated group were much less severe. In 1940, using a larger group, he showed a 44% reduction in the number of colds in the treated groups as compared with the colds. About 25% of the "immunized" individuals reported no colds at all.

These and other similar, although often not enthusiastic reports led us to try oral immunization for acute respiratory infections. For some years previous to 1939, it had been a fairly fixed policy of the Department of Health to administer (free) coryza vaccine to all students wishing it. Usually a series of six to eight different hypodermic infections were given at 2- to 3-day intervals, increasing the amount each time, until 1 cc. of the vaccine was tolerated. While the results were not tabulated, there seemed to be enough satisfactory results to justify the procedure.

The Health Department of the University of Arizona has a unique problem, as many students in the university have come to Arizona because of health problems—chiefly respiratory. Although we do not assume the responsibility for the treatment of chronic diseases, it is common knowledge that individuals with "weak" respiratory systems are more susceptible to attacks of colds and other acute upper respiratory infections; consequently, the continual increase in the number presenting themselves for parenteral coryza antigen injections, developed into a major mechanical problem. Accordingly, we began to experiment with the use of oral immunization. The preliminary trials were so satisfactory that the vaccine method was soon discontinued except in exceptional cases. In fact, a number of students who had little or no immunity from the vaccines were almost immediately benefitted by the tablets. With continued use, our complete skepticism changed to one of interest and finally to a moderate degree of enthusiasm.

While we were using the hypodermic method, we had made a practice of occasionally giving small doses of vaccine at the onset of acute colds for treatment of the existing infection in addition to the immunization treatments. Since the results in many such cases were quite satisfactory, we started the same procedure with the oral antigen tablets. At first we gave only one or two a day; soon we had increased the amount until we were giving eight tablets daily. From the first the results appeared quite dramatic. The rapidity with which the symptoms subsided in most persons was so noticeable that it seemed that it must be a coincidence. As we continued to observe the same results, we finally became convinced that we had a remedy in our hands that actually did appreciably shorten the course and lessen the severity of the common cold.

Not all persons were benefitted, there being approximately 10 to 20% in which the results were either doubtful or negative. Furthermore, the earlier in the course of the infection that the treatment was instituted, the greater the degree of relief that was obtained. In fact, the relief obtained has been so satisfactory that we have practically discontinued all other forms of medication for coryza, except palliative and supportive treatment. Students very susceptible to colds are advised to start a course of prophylactic immunization immediately afterward.

METHOD OF ADMINISTRATION

In the *treatment* of acute upper respiratory infections two tablets* are given about 30 minutes before each meal and two just before retiring—a total of eight tablets a day. This is continued until at least ten tablets have been taken. If the symptoms have not markedly abated by this time, administration is continued until another ten are taken, although if good results are obtained, they will usually be observed by the time the first ten have been taken. There is very rarely a slight nausea, especially when the tablets are taken too long a time before meals. No other untoward effects and no evidence of allergy has been observed.

In *immunization*, the student is advised to take one tablet daily for 7 days, and then three tablets weekly for at least 4 more weeks—preferably for 3 months. If an attack of coryza does appear, the dosage is immediately increased to eight tablets daily.

RESULTS OF TREATMENT

Immunization—In the role of immunization, we have not made a statistical survey of "number of colds before and after treatment" as is usually done. Such a study is often inaccurate and unreliable. In our case, the amount of statistical work, together with the impossibility of obtaining accurate past information, made such a study impossible. The only concrete evidence that we can give are the following figures:

In the school year 1938-1939 when no oral antigen tablets were given (but free parenteral vaccine was available to all) we had a total of 13,087 clinic calls, of which 2,684 were for colds or acute upper respiratory infections. The following year (1939-1940) free oral coryza antigen tablets were given to all students desiring them during the fall months. During the year there were 16,121 clinic calls, of which only 1,871 were due to upper respiratory infections; in other words, there were 33% less calls for colds, although there was an increase of 23% in the number of total calls. The *actual percentage*

* We have tried several varieties of oral antigen tablets but have had the best success with those manufactured by Sharp and Dohme (Vacagen). We have made a few studies (and are continuing these trials) with those manufactured by other companies, but so far we have not been able to duplicate the results obtained with Vacagen.

reduction in calls for acute upper respiratory infections (based on a comparison of the amount to be expected from the ratio to total calls in 1938-1939) was 43.5%!

The second set of figures comes from a study of the working time lost because of colds among the personnel of the university cafeteria. These men are working under conditions that predispose them to repeated attacks of acute upper respiratory infections—especially the cooks. Early last fall (October, 1940) each individual started a course of oral antigen immunization therapy. Up to February 1 (1941) there had been only about half as many colds as during the same period of the previous year; also the time lost due to illness (an accurate check) was less than half as great.

This fall each member of the entire football squad (about 70) was given a complete course of oral antigen tablets (20 to 30). Half of the men were given that manufactured by Sharp & Dohme and half by another company. In *both groups* there was only one case of coryza during the entire football season and this a very mild one. During the influenza epidemic in December only two cases of flu were found among the football squad, and these were not among those immunized by "vacagen." This is in sharp contrast to the fact that approximately 15% of the university student body had influenza between December 1 and 20. (And in the university there seemed to be proportionately less cases than in the city of Tucson as a whole).

In addition we must again mention the fact that a number of students who had received little or no benefit from repeated courses of parenteral vaccine were markedly helped by the oral tablets. At first we assumed this to be a coincidence, but with the repeated duplication of this experience it became more and more difficult to give this explanation as being the correct one. Since it is easy to become over-enthusiastic about a new treatment, one hesitates to say too much about opinions and let the data speak for themselves; however, there are certain observations that one makes that are difficult to reproduce statistically. It is our personal opinion that the oral antigen is more efficient than the parenteral injection; certainly it is much more easily and conveniently administered, and *students will usually complete the series.*

There may be some objection to accepting the reduction in colds among the student body as being due to the oral antigen administration. Certainly, (as will be mentioned later) part of the decrease in calls was due to the use of the tablets in treatment. However, the climatic conditions were very similar both years; also, the general health of the student body was similar both years. It is a rare thing for a student to come in with a severe cold (or repeated mild colds) when they are taking, or have recently taken, the oral antigen course.

In regard to the saving of time in the cafeteria group, there can be little if any valid objection; likewise in the case of the football squad. The procedure was so satisfactory that it is being extended to the basketball and track squads.

USE IN TREATMENT

This paper was written to point out the value of oral antigen tablets in the *actual treatment* of colds. We can find no previous reference to this method of treatment, and our results are so satisfactory that we feel that the results of our studies should be disseminated. We have already stated how we came to start the use of the tablets in treatment; also the dosage. The latter was arrived at after a period of trial and effort. In fact, the administration of this antigen forms the basis of most of our treatment of colds except for supportive measures.

Again a statistical survey would be desirable if it were accurate. Due to the impossibility of an accurate survey, we will outline the typical response, together with short "case histories" of several individuals treated, where we knew we could rely on the patients' impressions as being accurate and not over-emphasized.

The typical response is as follows: The patient consults us with a sore throat, some nasal obstruction, headache, and moderate malaise. The temperature is essentially normal. The symptoms have been present from 8 to 12 hours. He is put on a regime of oral antigen and supportive measures (including rest—which he usually utterly disregards), and is seen 24 hours later. At that time he says he feels much better, and wonders if he was really going to have a bad cold. The throat is still slightly sore, but the malaise and headache are practically gone. There may be a slight cough. The nasal congestion is improved. The student does not usually return again, but if he does there is much more improvement by the second day; by the third to fourth day all subjective and objective symptoms have disappeared.

CASE REPORTS

Some individual responses (quite typical) are as follows:

Case No. 1. Mr. A., a member of the athletic faculty and a sufferer from hay fever and asthma, came to one of us one evening (while on the train enroute to a football game) complaining of the symptoms of a severe cold. He apologized for requesting aid, stating frankly that his colds were very severe, lasted 4 to 5 days and were never alleviated or shortened by any form of treatment. He was started on oral vaccine therapy and told to go to bed. The next afternoon he returned with the report that the cold was much better and that all symptoms had abated. In fact, he apologized for seeking treatment, as he wondered if he really had been "coming down" with a bad cold after all. The symptoms continued to abate and were entirely gone in 2 more days. The patient remarked several times that we must have really put "something" in that "medicine."

Case No. 2. Mr. B., a man of about 37 years suffers with recurrent attacks of sinusitis, which while annoying are not serious. However, one or more times each year he contracts a general cold, which last at least a week. It is quite incapacitating and finally ends as a very obstinate cough with a very protracted sinus drainage. He had taken several courses of parenteral vaccine (cold) with no result. Finally in desperation he agreed to try the oral antigen. The results were almost dramatic. The first cold "dried up" with 2 or 3 days. A sec-

ond one developed several months later. Although this one lasted nearly a week, the symptoms were very mild. He himself agreed that had he gone to bed as usual the cold would have been gone within a few days. The last cold came a few weeks ago (nearly a year later). It only lasted 3 days and was very mild. In none of the three attacks (coming within a period of 16 months) did the long-drawn residium of sinusitis appear. He does state that in general the tablets have no effect on the latter condition, notwithstanding the fact that he practically carries the oral vaccine in his pocket to have them readily available in case of the onset of a cold.

Case No. 3. Miss C., a student at the university about 18 years of age would have one cold after another all winter long. She was finally induced to try the oral antigen at the onset of a cold. She came back the next day with all symptoms abated and very enthusiastic about the medication. Within 3 days all signs of the infection had disappeared. During the rest of the year she only had one more cold—a very mild one responding to the antigen as before. This fall she was started in on immunizing treatment and has not yet been in with a single cold (over 4 months).

Case No. 4. Mr. D., a member of the athletic faculty (about 35 years old), developed a severe cold on the evening of a basketball game. Seeking our advice he was advised to take the oral antigen. Although he knew of the excellent results with the football squad (immunization treatment) he was a bit skeptical about the tablets. However, he took four tablets during the evening and two the next morning. By noon the cold was so nearly gone that he hesitated to take more. By evening he felt entirely well. He is now *voluntarily* taking the tablets as prescribed for the immunization regime. He stated repeatedly that he could scarcely believe his own feelings.

As case No. 5 we will mention the experience of a local druggist. After hearing about our use of oral antigen in treatment of colds, he copied the directions off of one of our prescriptions and tried the tablets for a cold he had just contracted. The next day the cold was gone. He was so pleased he tried the remedy on his family with the same results. He informed us of the above results, somewhat apologetically, as he thought we would be interested.

We might continue on this way almost indefinitely, as the history is so similar in most cases. We have cited the cases of older people, as we believe their opinion to be more reliable. The history in the students is essentially the same. In fact, after prescribing the vaccine early in the course of a cold, the *average student* does not find it worth while to return for future treatment. Whereas the average number of calls per patient who does not take the antigen is at least three, the average student receiving the oral antigen does not even return. This is undoubtedly one of the reasons for the outstanding reduction in the calls for respiratory infections during 1939-1940 (as mentioned above).

In chronic respiratory diseases (sinusitis, asthma, hay fever, etc.) we have not been able to observe any benefit, other than a reduction in the number of colds. During the epidemic of influenza this past December, we used the oral antigen routinely. We believe that it may have modified the course somewhat, but the results were not striking nor outstanding. We do believe it was of benefit in one way. There were absolutely no complications in those patients receiving the antigen (about 75%): whereas in those not taking the vaccine, there were three cases of otitis media, one case of bilateral pneumonia, and two cases of acute (severe) pansinusitis.

DISCUSSION

The mechanism of action of the antigen in *preventing colds* is assumed to be at least partly understood. However, it is not so easy to understand the immediate, dramatic results in *treatment*—often within 24 hours. The manufacturers of "Vacagen" (Sharp & Dohme) state that their product is an enteric coated, water-soluble extract. If this be true, this may help to explain why we apparently obtained better results with this product than with others consisting of capsules of whole bacterial bodies. It is possible that the enteric coating prevents the action of the gastric juice on the material, and that once reaching the small intestine the water-soluble product is rapidly absorbed without much decomposition. From the results we have observed it seems very plausible that the antigen is present in a readily available form, and the immunological processes are immediately stimulated in a very efficient manner.

While we do not feel that the oral antigen is the panacea for all colds, we do believe that it is definitely useful. We certainly think that it merits further use on our part, and a trial by others caring for such conditions. We want to re-emphasize the fact that it should be: (1) given early (within 24 hours at least), (2) given in sufficient amounts, and (3) at regular intervals. It is obvious that the general routine of supportive care should accompany the use of the preparation. Also, we want to re-emphasize the fact that we can find no previous report on the use of oral antigen in treatment of colds. It will therefore require future observation and investigation on the part of others to confirm or disprove our findings.

SUMMARY

1. Evidence is presented that the oral form of immunization for acute upper respiratory infections is more effective than the parenteral vaccine. The tablets should be taken faithfully over a period of at least 3 months to obtain the optimum results.

2. The "oral vaccine" or antigen tablets has been used in the *treatment* of coryza with excellent results. The tablets are given in fairly large amounts and as early as possible in the disease. At least three-fourths of the sufferers experience definite relief and in many the improvement is dramatic. We have had the best results with an enteric-coated, water-soluble extract. We report this procedure as a new method of treating colds.

3. Our results have been so satisfactory that we are continuing the use of the tablets (both immunization and treatment). We feel that our experience justifies the trial by other physicians of this

form of therapy for acute upper respiratory infections.

University of Arizona.

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The Leiboff Test

*Comparison With the Hinton, Kahn, Kline and Mazzinui Tests**

ROBERT A. GREENE, Ph. D.,
and
EDWARD L. BREAZEALE, M. S.
Tucson, Arizona

LATE in 1939, Leiboff[1] described a new slide test for the laboratory diagnosis of syphilis. Leiboff claimed certain advantages which seemed desirable in a slide test, so this new method was compared with other well-known flocculation tests which have been employed in this laboratory.

EXPERIMENTAL

When blood specimens were received at the laboratory, the serum was separated and was heated at 56 degrees C. for 30 minutes in an electrically controlled water bath. One or more of the following tests were then employed: Hinton, Kahn, Kline (diagnostic), Leiboff and Mazzini. The tests were performed in strict accordance with the technic recommended by the originators, with the exception that in the Leiboff test, slides with paraffin rings (as used in the Kline test) were used and 0.05 ml. of serum, measured with a pipette, were employed rather than the two drops of serum (approximately 0.08 cc.) suggested by Leiboff.

The Hinton indicator was prepared in this laboratory; the Kline antigen was purchased from LaMotte Chemical Products Company. The Kahn antigen was obtained from the Michigan State Board of Health; L. Y. Mazzini furnished the antigen employed in his test, and the Leiboff antigen was supplied by S. L. Leiboff and the Paragon C. & C. Company, New York.

RESULTS

Series I: The Kline diagnostic, Leiboff and Mazzini tests were employed in the examination of blood specimens of college students, submitted in connection with physical examinations.

The results are:

KLINE, LEIBOFF, MAZZINI	
All negative	1108
All doubtful	1
All positive	2
Total	111

There was 100% agreement in this series. The doubtful and positive sera gave similar reactions to the Hinton and Kahn tests.

Series II: The Kline, Leiboff and Mazzini tests were performed on blood specimens submitted for registrants for selective service.

The results are:

KLINE, LEIBOFF, MAZZINI	
All negative	2633
All doubtful	15
All positive	215
Total	2863

There was 100% agreement between the three tests. The 230 doubtful and positive sera gave identical results with the Hinton and Kahn tests.

Series III: The Hinton, Kahn, Kline, Leiboff and Mazzini tests were applied to a series of blood specimens submitted to this laboratory. A large part of these were submitted routinely in connection with the examinations of food handlers, civil service employees, and from prenatal and venereal disease clinics. Included in this series are specimens from syphilitics, treated and untreated, and from all stages of the disease. All age and social groups and races common to Southern Arizona are represented.

HINTON, KAHN, KLINE, LEIBOFF AND MAZZINI	
All tests negative	5511
All tests doubtful	83
All tests positive	1244
Results not agreeing	64
Total	6902

The agreement between all five tests in this series was 99.07%.

An analysis of the results which were not in agreement is given below:

RESULTS OF TESTS NOT IN AGREEMENT

	HINTON	KAHN	KLINE	LEIBOFF	MAZZINI
Negative	20	12	2	9	5
Doubtful	9	30	26	29	30
Positive	35	22	36	26	29
Total	64	64	64	64	64

The majority of the specimens in the group of 64 came from known syphilitics, treated and untreated. In such a group, conflicting results are not uncommon.

DISCUSSION

The Leiboff test has given excellent results in this laboratory, which compared favorably with those given by the Hinton, Kahn, Kline and Mazzini tests.

The Leiboff test possesses certain qualities in ease of performance and ease of reading of results which should make it a valuable laboratory procedure. Since the technic is practically identical to that of the Kline and Mazzini tests, the Leiboff test can be performed simultaneously with the other tests.

CONCLUSION

In a series of 1,111 blood specimens from college students and 2,863 specimens from registrants for

* From the Arizona State Laboratory.

selective service, there was absolute agreement between the Kline, Leiboff and Mazzini tests.

In a series of 6,902 specimens which contained a large number of syphilitics, the absolute agreement between the Hinton, Kahn, Kline, Leiboff and Mazzini tests was 99.07%. In 64 cases, chiefly treated syphilitics, or old untreated cases, results were not in perfect agreement.

The Leiboff test has given excellent results in this laboratory and possesses certain qualities which should make it a valuable laboratory procedure.

University of Arizona.

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The author gratefully acknowledges the assistance of Mr. L. Y. Mazzini, Mr. S. L. Leiboff and the Paragon C. & C. Company, New York, who supplied the reagents for these two methods.

Tests for Serum Sensitivity

JOHN D. LEMAR, M.D.
Omaha, Nebraska

SERUM reactions of various types and degrees of severity have been noted since the therapeutic and prophylactic administration of animal serums was begun at about the turn of the century. They have been reduced in frequency with the development of methods of concentrating and refining serums, but they still are frequent enough to warrant careful study. It is the purpose of this paper to describe some of the tests for serum sensitivity which are available and to discuss their significance.

SKIN REACTIONS

It has been customary for a good many years to test a person about to receive any type of foreign serum by injecting a small amount of that serum into the skin. The test as used today consists of the intracutaneous injection of the serum in question diluted 1:10 or 1:100. Usually about 0.1 cc. is given. It is wise to use the greater dilution on persons who have a history of previous serum reactions or in whom there is history of personal or familial allergy. Care should be used in giving this test. Accidental subcutaneous administration may result in severe symptoms in a highly sensitive person. Cutaneous reactions usually develop within 10 to 20 minutes. The various types which appear may be described as follows:

Type I. Traumatic reaction: The original wheal raised by the injection of the diluted serum does not enlarge, and usually there is no erythematous flare about the wheal. The whole lesion disappears in a relatively short time. The flare of erythema may persist for several hours. This reaction has no significance.

Type II. Serum sensitivity reaction—immediate: In this case the original wheal becomes enlarged, an area of deep erythema develops about the site of the injection, and pseudopodia appear very soon. A good many cases show some subcutaneous edema, local urticaria may or may not appear in this type of sensitivity reaction, and the total picture, while appearing in 10 to 15 minutes, sometimes lasts several days. This type of reaction indicates sensitivity to proteins contained in the serum.

Type III. Serum sensitivity reaction—delayed or secondary: This is an erythema which follows 2 to 10 days after the original injection. Sometimes there is edema and frequently there is local urticaria. Pseudopodia may appear about the original site. This type of reaction seems to be more frequent in younger persons. There is a tendency for it to last for several days, varying from 24 hours to as long as 10 days. It appears most frequently in those who are either inherently allergic or who have received previous injections of serum.

Davis[1] has described these reactions in detail. According to his findings, some patients who had been injected with serum 20 years previously still had positive sensitivity reactions. In a group of 150 people, with no history of allergy or previous serum injection, reactions of one type or another appeared in 30%, whereas in a series of 100 persons with a positive history, 88% had positive skin reactions which were more intense and had a longer duration than in the case of the previous group. From this it appears that a person need not have a history of serum injection or of personal or familial allergy in order to be sensitive to serum. It is true that those who have received serum previously are much more likely to be skin-sensitive than those who have not received it. We see many children and young persons who have been rendered skin-sensitive by some previous injection of a prophylactic or therapeutic serum.

We should remember that skin tests with serum are not entirely trustworthy. A person reacting negatively to the skin test is not likely to have a serum reaction of the immediate type. On the other hand, a skin-sensitive person is sometimes able to receive serum without any unusual effect. For this reason, it is necessary to employ the more sensitive and specific ophthalmic test.

OPHTHALMIC TEST FOR SERUM SENSITIVITY

This is usually done by placing one drop of serum, either whole or diluted, in the conjunctival sac of one eye. In persons suspected of sensitivity, or in whom marked skin sensitivity has been demonstrated, it is probably wise to use a diluted serum (1:10 or 1:100). Some authors believe that the undiluted serum may be used in any case.

A positive reaction consists of dilation of subconjunctival vessels and in some cases edema of the conjunctiva itself. It occurs rather quickly, usually being well-marked within 10 to 15 minutes.

(Continued on page 153)

From the Department of Public Health University of Nebraska College of Medicine.

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NOW, LET'S SEE—

Change in itself is not necessarily good. Yet, all progress is the outcome of change. Hurtful though it may be, yesterday cannot be lived again by any mortal.

We of the profession of medicine have evolved a way of conduct through the centuries that we think good for us and for our masters, society. Some of us hate to see any changes brought about, others of our calling are willing to support some changes. Our present way of doing things came to us through change, we must remember. Our current ethics, our current concepts of the practice of our beloved science were not handed to us in toto on a graven stone a thousand years ago. Not at all. As society evolved from the troglodyte era, where one man's acts affected but a handful of people, to the present complexity where even a man's sneeze is the concern of thousands, so did professional behaviorism evolve. So, remembering, we need not be wholly terrified at the prospect of some changes in our present way of practicing medicine.

Too many of us, in our rugged individualism, lose sight of the fact that we possess that measure of individual freedom by grace of our masters, the people at large. We grumble about the "New Deal", saying that all was well until the government started interfering with us. Well, that isn't thinking it through. That is the acceptance of a phrase thought up by someone else. That is the search for a scape-goat to blame for our discomfiture at seeing our placid pond disturbed. That catching at a passing straw is what passes for thinking too often. For, who is the New Deal? What is it? Simply stated, that entity is the majority of the people of the United States of America. And there is no gainsaying that fact. How did it come to be born? Again, dealing with elements only, certain minority components of society had developed and fostered a multitude of abuses, and were more concerned with perpetuating what they pleased to call their rights than they were with the good of the whole. The majority of the people in this glorious free land finally sighted leaders who voiced for them their pent-up feelings. They voted for these men, and placed them in a position of power, and rapid changes in many things began to appear. Obstructionists were swept aside. And in the cleaning of the temple some of the innocent were hurt, some good things were ruthlessly crushed.

And that leads to the point of this discussion. Unfortunately, American medicine has allowed itself to be catalogued as a force of obstruction. That is partly the fault of certain of our own leaders. It is likewise partly the work of certain very clever starry-eyed do-good dreamers in high governmental posts. Those of us in the rank and file have sensed, rather uneasily, that trouble was ahead for our beloved profession if we persisted in our attitude of being violently against everything that society proposed in changing our ways. We haven't said much about it, we just went along, hoping we might be wrong. And now trouble is here. It must be faced, honestly and with realism, in an adult fashion.

Candidly, do you think that a streak of malleability would have saved this beloved profession of ours from the ignominy of being dragged before a criminal court?

CARL MULKY, M. D.

At the recent annual session of the New Mexico Medical Society, Dr. Carl Mulky, of Albuquerque, was elevated to the presidency. He has served as president-elect this past year.

Dr. Mulky was born at Knoxville, Iowa. His early education was received in the local schools. Academic work was done at the State University of Iowa. His medical education was accomplished at Chicago Homeopathic Medical College and Rush Medical College. Later he took postgraduate training at the Trudeau School of Tuberculosis. He then began the private practice of medicine, returning to his home town and remaining until 1916, when he entered the Cleveland Municipal Tuberculosis Sanatorium as a resident physician, serving for a year. In 1917 he entered the service of the United States Army, working as a Captain in the Medical Corps until 1919. Following the Armistice Dr. Mulky went to Albuquerque. Since 1920 he has limited his practice there to diseases of the chest.

Dr. Mulky is a member and past-president of

the Bernalillo County Medical Society; Fellow of the American Medical Association; Fellow of the American College of Chest Physicians; Medical Director of the New Mexico State Tuberculosis Sanatorium at Socorro; Consultant in Tuberculosis to the U. S. Indian Service; president of the New Mexico Tuberculosis Association; president of the Medical Staff of the U. S. Indian Hospitals, United Pueblos Area; member active staff of the Southwestern Presbyterian Hospital; member attending staff of the Methodist Deaconess Sanatorium.

Dr. Mulky married Maud Edna Clark of Knoxville, Iowa. He has no children. Non-professional memberships include the Masonic lodge and all its affiliated bodies. He is past-potentate (1939) of Ballut Abyod Shrine.

THE PHOENIX SESSION

The 50th anniversary of the Arizona State Medical Association was celebrated at the recently concluded session in Phoenix. At the deliberations of the House of Delegates the following officers were chosen to guide the Association into the next critical year: Dr. E. Payne Palmer of Phoenix, president-elect. He will succeed Dr. W. Paul Holbrook, current president, at the 1942 session in Prescott. Others chosen are:

Dr. Otto E. Utzinger, Ray, vice-president, succeeding Dr. Leslie R. Kober, Phoenix.

Dr. W. Warner Watkins, Phoenix, re-elected secretary.

Dr. C. E. Yount, Prescott, re-elected treasurer.

Dr. Carlos C. Craig, Phoenix, speaker of the house of delegates, succeeding Dr. H. D. Ketcherside, Phoenix.

Dr. John W. Pennington, Phoenix, councilor for the state's central district.

Dr. Harold W. Kohl,. Tucson, re-elected delegate to the American Medical Association.

Dr. J. D. Hamer. Phoenix. alternate delegate to the national association.

Dr. D. F. Harbridge, Phoenix, retiring president, automatically became one of the councilors-at-large succeeding Dr. C. R. Swackhamer, Superior.

The holdover councilors-at-large are Dr. Hal W. Rice, Bisbee, and Dr. Charles S. Smith, Nogales. Holdover district councilors are Dr. George O. Bassett, Prescott, for the northern district, and Dr. Dan L. Mahoney, Tucson, for the southern district. Dr. Pennington succeeded Dr. George C. Truman, Mesa, as central district councilor.

In connection with the session several interesting interviews were given local newspapers by various members. Some noted:

1. Dr. D. F. Harbridge, retiring president of the state medical association, recommended in his annual report to the membership that the work of the federal-state-crippled-children's division, public health department, National Youth Administration and agricultural workers' medical programs, insofar as doctors are concerned, "be more widely distributed among the physicians over the state."

"There is a tendency, it would seem, to centralize this work in the more populous centers, which is not a sound principle," he said.

Dr. Harbridge emphasized that "The practice of medicine is an intensely personal matter, while these public aspects of medical practice tend to eliminate the personal phase sooner or later."

"A gradual balance will be attained, no doubt," he said, "whereby the physicians who have a preference for public work will gradually swing into that entirely while others develop their private practice exclusively. A mixture of public and private medicine in practice is not conducive to professional or public good."

2. "The job of being a physician of medicine and surgery has taken on new aspects, especially during the past 10 years," said Dr. J. D. Hamer, Phoenix, chairman of the council's executive committee of the state association. "Formerly a physician's practice was almost exclusively devoted to the care of his private patients, with some charity work added for good measure.

"Today the picture is different, due to the advent of increased programs in the department of public health, and with the new social security health programs such as crippled children, aid for the needy blind, tuber-

culosis welfare sanitarium, agricultural workers health and medical program and similar activities arising under the new provisions of government.

"A physician in private practice now not only takes care of his own clientele of patients but participates in these various general health programs as well."

3. Dr. Morris Fishbein, discussing aspects of the national defense program:

"Aviation has become an important arm of our defense," he said. 'Ninety-five per cent of the airplane accidents are credited to the physical failure of pilots and only five per cent to the physical failure of the airplane. Yet millions are spent on airplane research and only a niggardly amount on pilot research.

"Blood plasma research alone under our medical preparedness program, would cost some $50,000. But of all the government funds available for medical research for all purposes, the total is only $50,000. Even Canada does a lot more research on pilot health than we do."

The Woman's Auxiliary to the Arizona State Medical Association held concurrent session.

Mrs. Harlan P. Mills, Phoenix, Thursday was named president-elect. Mrs. Mills was elected for a term beginning in 1942, succeeding Mrs. B. B. Edwards, Tucson, who assumed the presidency Thursday as successor to Mrs. J. D. Hamer, Phoenix.

Other new officers are Mrs. H. W. Kohl, Tucson, first vice president; Mrs. O. W. Thoeny, Phoenix, second vice president; Mrs. H. S. Denninger, Glendale, recording secretary ,and Mrs. Norman Hall, Phoenix, treasurer. Mrs. Hamer was named to the board of directors.

Named as voting delegates from the Pima county auxiliary were Mrs. Edward Hayden, Mrs. Royal Rudolph and Mrs. D. L. Secrist, all of Tucson, with Mrs. Kohl, Mrs. Harvey Faris and Mrs. Ludwig Lindberg as alternates. The Maricopa county group named Mrs. Denninger and Mrs. Benjamin Herzberg of Phoenix, with Mrs. Lloyd Swasey and Mrs. C. C. Craig as alternates.

The House of Delegates held frequent sessions.

Among projects discussed in business sessions were reapportionment of the house of delegates; expansion of the state's anti-cancer campaign; a proposed study of occupational diseases; a move to "more widely distribute" certain federally sponsored medical programs; furthering maternal and child health in the state; advancing tuberculosis control in Arizona; continuing cooperation in public health programs, and preparation for any shortage which might occur through physicians being called into military service.

Further reports on decisions regarding these matters will be available to members during the coming year, as the projects are developed.

Several sessions of the scientific section were thrown open to the general public. This is a development of the conviction that the public can be best educated along the lines of better health by personal contact with medicine's leaders and teachers. Exhibits, motion pictures lectures were thus offered the laity.

The last afternoon was given, as usual, to the golfers. This important and essential phase of the annual meeting was held at the Phoenix Country Club.

Many and puzzling are the problems confronting organized medicine in the immediate future. Sensing this, the Arizona Association has chosen to guide them an experienced, thoughtful group of officers. The account of their year's stewardship will be rendered next spring in Prescott. The choosing of this northern city as a site for the practice of the past several years, whereby the session alternated between Tucson and Phoenix.

NURSES NEEDED FOR THE GOVERNMENT

As a part of the National Defense Program, the Government months ago began preparation to meet an anticipated need for an unusually large number of nurses, both in its military and civil services. The United States Civil Service Commission has announced open continuous examinations to secure nurses' but despite these examinations, there is a continuing acute shortage of nurses for the civil service positions.

From all parts of the country, floods of inquiries are coming into Washington from women who ask how they can serve their country in the present emergency. The word to nurses is that the nursing branch of the service is one that is vital to the success of the National Defense Program. The nurse examinations open the way to an opportunity to render patriotic service, and at the same time to serve in interesting and satisfying work. There is an opportunity for advancement, and the Government provides for retirement for superannuation or disability.

A large staff of nurses is employed regularly in the civil service—principally in the U. S. Public Health Service, the Indian Service, and the Veterans' Administration. They serve in hospitals and other medical centers throughout the United States and in the Panama Canal Zone and Alaska. Public health nurses carry on field work of community-health care and education, giving home care to the sick. class work in home hygiene, etc., principally in the Indian Service and the U. S. Public Health Service. In the more remote regions these nurses render first aid, and they even give emergency medical treatment in the absence of a doctor. There has been an increased demand for public health nurses under the U. S. Public Health Service in extra-cantonment zones and where large defense industries are located.

Two examinations are now open for receipt of applications. One—Announcement No. 38—under the title of PUBLIC HEALTH NURSE, $2,000 a

year, and GRADUATE NURSE, $1,800 a year (for general staff duty), is open for the U. S. Public Health Service and the Indian Service, including Alaska. This is an "unassembled" examination: Applicants are not given a written test but are rated on their professional training and experience as shown in their applications and by other evidence. The other—Announucement No. 100—under the title of JUNIOR GRADUATE NURSE, $1,620 a year, is for the U. S. Public Health Service, the Indian Service, and the Veterans' Administration. This examination now includes a written test. It is expected, however, that it will be closed soon and reannounced as an "unassembled" examination. The Civil Service Commission does not expect to require a written test of persons who have already filed their application but who have not been given the test.

The need for nurses is immediate. Further information is available at the office of the Secretary, Board of U. S. Civil Service Examiners at any first- or second-class post office, or write to the U. S. Civil Service Commission, Washington, D. C. Readers may help by passing this article to nurses or nursing schools.

TESTS FOR SERUM SENSITIVITY

(Continued from page 149)

When severe it is easily controlled by placing one drop of 1:100 adrenalin chloride in the eye. The significance of a positive conjunctival test is the same as the positive skin test except it is generally conceded to be somewhat more specific and dependable than the skin test. There have been instances where extremely sensitive persons have developed violent general reactions on being given the conjunctival test. I have seen one person develop severe generalized urticaria with edema of the face and larynx 20 minutes after the test was given; there was only very slight conjunctival reaction.

SIGNIFICANCE OF THE SKIN AND CONJUNCTIVAL TESTS

A positive skin test always suggests serum sensitivity. There is no way of being certain that a person who has a positive skin reaction will escape serious general reaction when serum is administered. It is admitted that some persons do. When the skin test is positive, but a subsequent conjunctival test is negative, there is considerable possibility of immediate serum reaction. When the skin test is positive and the eye test positive, great caution should be used in giving serum of any kind. The probability of immediate serum reaction is very great and in the person who has an allergic history, these reactions are likely to be severe and in some cases may even be fatal. The person who has the history of being allergic to horse dander is to be regarded as likely to develop severe immediate reaction.

DISCUSSION

Any person who is about to receive animal serum should be handled according to a definite program. A history should be taken first in regard to personal or family allergy, particularly asthma. A patient with a personal or family history of hay fever, eczema, or even of vasomotor rhinitis and drug idiosyncrasies, is to be regarded as a likely candidate for a serum reaction. A history should also be taken in regard to previous serum injections, serum reactions, if any, and the type of serum used.

Every person who is about to receive serum should be tested by the intracutaneous method. In "The Therapy of (Horse) Serum Reactions" (The Therapy of the Cook County Hospital), it is recommended that a dilution of 1:100 be used first and about 0.05 cc. be given intracutaneously. A syringe full of epinephrine should be at hand. A conjunctival test should also be done, using a 1:100 serum dilution. Both of these tests should be observed for 20 minutes.

A patient without an allergic history, and without either a positive skin or conjunctival reaction, may receive the whole amount of serum subcutaneously or intramuscularly.

The person who has no history of personal allergy or of previous serum injection, who shows a positive skin reaction but a negative ophthalmic test, may be given serum. It is wise to bear in mind that these persons may get an accelerated serum reaction. Such a reaction would resemble serum sickness but would come on much sooner and get much more severe than the serum sickness.

In the person who has a positive allergic history or in which there has been a previous serum injection, or a history of previous serum reaction, an eye test with 1:10 dilution should be done if the conjunctival test with 1:100 dilution is negative. If the skin reaction and the ophthalmic reactions are entirely negative, administration of serum is probably safe.

The patient with a history of sensitivity to horse dander, and in whom both skin and ophthalmic tests are positive, is most likely to get a very severe and perhaps fatal reaction. This person is inherently allergic and it probably is not safe to give him serum under any circumstances.

There have been many methods of desensitization recommended for use on persons of the latter type, but many workers in the field believe that it is not even wise to attempt desensitization in such persons unless the administration of serums is a life-saving procedure. It would be better, if possible, to treat this person with a serum from another animal to which he is not sensitive. Frequently, however, such serums are not available.

The author has seen one person of this type collapse and die within 3 minutes after the intradermal administration of 0.1 cc. of serum diluted 1:100.

The development of human convalescent serum and of the sulphonamide group of drugs has made it possible in many cases to forego administration of animal serum entirely. Deaths have not been so

very frequent from the administration of serum, but it is our duty to avoid that possibility. It should be remembered that none of these tests in any way predict the possibility of development of serum sickness.

We should be reminded again that the administration of serum, even for prophylactic purposes, is not an innocuous procedure. Even when serum reactions do not occur, there is a very good chance of sensitizing the person receiving the serum so that in the future he will be barred from receiving additional serum or will be able to take it only at considerable risk. For this reason, routine administration of serums is to be condemned. They should be used only when there is a real indication for them and the person receiving them should be made acquainted with the possibility of an immediate or delayed reaction in himself. He should also be made aware of the possibility of becoming sensitized.

42nd and Dewey Ave.

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COMMUNICATIONS

Sir:

In order that the death benefits may be paid immediately to the widows and orphans of those employees insured under the Social Security Act, an arrangement has been made by which the local registrars forward to the Social Security Board, a notice of the death when the death certificate is filed.

The death benefit is a fund which comes from the wages of the employees, for the purpose of paying the last expenses of the deceased. Upon proceeds with the payment of the death benefit the receipt of the notice of the death, the Board immediately.

The operation of this plan, however, depends almost entirely on the Social Security Number being placed on the death certificate, and the delay in the payment of the death benefit occurs when the death certificate does not show the Social Security Number, and is not reported immediately to the Board.

I am requested by the Bureau of Old-Age and Survivors Insurance of the Social Security Board to address this letter to you with the hope that you will assist the undertaker in securing the Social Security Number at the time of the death. and in this way help the widows and orphans secure the fund which the husband has set aside for the last expenses.

Very truly yours,
W. A. DAVIS, M. D.,
Special Agent, Social Security Board,
Austin, Texas.

Sir:

Under the authority of the Surgeon General of the Army, microfilm copying from the medical collections of this Library has been conducted for nearly three years by Bibliofolm Service, a nonprofit agency having its headquarters in the Library of the U. S. Department of Agriculture. Although this service has rendered valuable aid to many research workers, it is believed that a microfilm copying service operating within the Library itself, and specializing in the field of medicine, will be able to contribute even more to the advancement of medical science.

A new service has been established through the generosity of a group of "Friends of the Army Medical Library". It has been given the designation "Medicofilm Service", and its purpose and plan of operation is described in the accompanying pamphlet, which contains the latest corrected list of some 4,000 medical and related periodicals, pamphlets, reports and proceedings currently or occasionally received in the Army Medical Library.

The service described will be operated on a nonprofit basis solely for making the extensive medical literature collections of the Army Medical Library available to research workers who are unable to come in person to consult them. The Library cooperates by providing the necessary space for the work and by supplying the publications from which microfilm copies are made. The only cost to the user will be for actual labor and materials required in making and distributing the microfilm copies. In case the established price should yield more funds than are necessary to pay the actual cost of operation, prices will be reduced in proportion.

HAROLD W. JONES,
Colonel, Mel. Corps, U. S. Army,
The Librarian, Army Medical Library,
Washington, D. C.

NEWS

General

The Illinois State Department ofPublic Health and the Children's Bureau, U. S. Department of Labor are sponsoring ten 4-weeks courses in obstetrics at the Chicago Lying-in Hospital during the fiscal year 1941-1942. Only a limited number of physicians will be accepted for each course. The only cost to the individual is for room and board and $25.00 ($10.00 of which is refunded at the completion of the course). Application and inquiries should be addressed to. Postgraduate Course, Department of Obstetrics and Gynecology, 5848 Drexel Avenue, Chicago, Illinois.

El Paso

The regular meeting of the El Paso County Medical Society was held on March 10, 1941 at 8:00

P. M. at the Hotel Cortez. The minutes were read and approved.

Dr. O. S. Lowsley from New York City presented the program for the evening instead of the program which had originally been announced. Dr. Lowsley presented talks on several genitourinary subjects which were very interesting and very instructive and illustrated with moving pictures. There was a very large turn out for the meeting and there were many out of town visitors.

After the program a short business meeting was held in which Drs. Steve F. Turner and William T. Guy were voted into the County Medical Society in due form.

An announcement was made by the secretary that the N. Y. A. contract had been accepted by the Executive Committee and since it had already been accepted by the County Medical Society was now ready to operate. The secretary asked for all those who wished to participate in the plan to please submit their names to the secretary so that their names could be on file.

Dr. Waite announced that the Weed Eradication committee had made their report and were now waiting for further action to be taken.

EL PASO COUNTY MEDICAL SOCIETY

At a regular meeting of the El Paso County Medical Society, April 14, 1941 at Hotel Cortez, the following program was given:

1. Public Health Approach to the Control of Diarrhea in Infants.....Dr. L. T. Cox
   Discussion by Dr. L. P. Walter
2. Post-Nasal Fibroma.....Dr. F. P. Schuster
   Discussion by Dr. M. S. Hart
3. Fear as a Psychological Element and Psychatric Symptom.....Dr. S. D. Swope
   Discussion by Dr. P. E. McChesney

At the April 1 meeting of the Staff of Hotel Dieu the following program was given after luncheon:

1. Peptic Ulcer.....Dr. Vance
   Discussion by Dr. Murphy
2. Coronary Thrombosis.....Dr. Werley
   Discussion by Dr. Rheinheimer

AUXILIARY NEWS

El Paso

Mrs. Arthur Black, president of the Woman's Auxiliary to the El Paso County Medical Association, has announced the committee chairmen for next year.

Committees and their chairmen are: General health and program, Mrs. Louis Breck; public relations, Mrs. A. D. Long; County Hospital and Clinic, Mrs. R. B. Homan, Jr.; vital statistics, Mrs. Paul Gallagher; philanthropy, Mrs. George Turner; physical examinations, Mrs. Will Rogers; social, Mrs. John Pangman; courtesy, Mrs. I. M. Epstein; music, Mrs. Grady Causey; telephone, Mrs. Russell Holt; yearbook, Mrs. L. O. Dutton; publicity, Mrs. Robert Thompson; historian, Mrs. Gerald H. Jordan; parliamentarian, Mrs. George Brunner; ways and means, Mrs. Francis Snidow; Hygeia, Mrs. T. C. Liddell; decorations, Mrs. James Gorman, and budget, Mrs. F. O. Barrett.

Arizona

The Woman's Auxiliary to the Arizona State Medical Society met at ten o'clock April 17, 1941 at the Hotel Westward Ho, Phoenix, Arizona. Dean Edwin S. Lane gave the invocation. The visiting ladies were welcomes by Mrs. Charles Ploussard, president of the Maricopa County auxiliary.

Mrs. E. Henry Running, chairman of the social activities, told of an informal luncheon following the meeting at the hotel, a tea at the home of Mrs. Charles Ploussard, and a dinner that evening at Camelback Inn, one of the outstanding winter resort hotels on the desert; a luncheon on Friday, April 18th at Jokake Inn, another beautiful resort hotel near Phoenix.

Mrs. Jesse D. Hamer, state president, said that the Woman's auxiliary can do much to help the Medical Society to keep its high standards. She also said that Yavapai County had recently reorganized and that Pima and Maricopa counties who have had organized auxiliaries have 125 memberships. These auxiliaries take part in local activities, namely: Community Chest and Red Cross drives; Pima county gave $100.00 to the Tucson Preventorium and $50.00 to the school milk fund. Maricopa county contributed to the Community Chest, the Crippled Children's Home, and $5.00 a month to the school lunch project; also toys were distributed to children who were in the hospital at Christmas. Mrs. Hamer told of contacting wives of doctors throughout the state not belonging to an auxiliary and of asking them to become members at large to the State auxiliary.

Mrs. C. Lawrence von Pohle of Chandler, state commander of the Woman's Field Army for the control of cancer, and Mrs. Alvin Kirmse chairman of cancer control for the Medical auxiliary, are preparing to launch a campaign soon.

Mrs. James Moore, chairman of legislation, told of the passing of House Bill 178 on osteopathy, giving osteopaths the right to do surgery by legislation and not education. This bill was passed by both Houses without a public hearing and signed by the governor of the state. A referendum was suggested and all doctors and their wives are now getting signatures for petitions.

Another bill of interest to the auxiliary is one to take the state insane asylum out of politics. Only doctors with experience in this line of work will be permitted to have charge of the institution. The children's colony bill which seeks to have mentally deficient children segregated is also of great interest to us.

Dr. Henry F. Helmholz, professor of pediatrics at the University of Minnesota, talked to the aux-

iliary. He ended with the thought that we must not think of health as an end, but as a means to an end. Our children must be physically fit so as to be able to assume their responsibility as coming leading citizens.

On Friday morning, Mrs. Joseph Madison Greer read a memorial tribute to two of our members, Mrs. John Wix Thomas and Mrs. Charles W. Sult. Mrs. Lloyd Swasey played a violin number during the service.

Dr. C. G. Salsbury, of Ganado Indian Mission talked to the auxiliary on medical care of the Navajo Indians. Contrary to public belief, he told us that the Indians are not a vanishing race. In 1890 there were 8,000 Navajo Indians and today there are 50,000 bursting the borders of the Navajo reservations. These Indians are nomads and all have their herds of sheep. He told of having a nurses' training school at Ganado for Indian girls and said one girl in training is from Alaska. The most interesting thing to me in his talk was that the medicine man is willing to take a back seat now for he realizes that although he can cure the minor ailments of his people, surgery must be done at times and the white doctor will do the job well.

Mrs. Harlan P. Mills of Phoenix was elected president for 1942. Mrs. B. B. Edwards of Tucson is the incoming president for 1941.

Mrs. Lloyd Swasey of Phoenix was elected a delegate to the national convention to be held at Cleveland and Mrs. H. W. Kohl of Tucson was elected alternate delegate.

Respectfully submitted,

MRS. C. C. CRAIG,
Phoenix, Arizona.

MISCELLANY

AVIATION MEDICINE

After careful selection, the next and most difficult job of the flight surgeon is to keep a careful watch over the physical fitness of our pilots so that they may alwayc be equal, in so far as physical efficiency is concerned, to the flying missions assigned them. With regard to selection, in which flight surgeons reject about 75 per cent of all applicants who appear before them, we are still conducting extensive researches in order to enable us to select the very best material available from the standpoint of flying adaptability. After 20 years df trial and error development, flying has now reached a high plane of efficiency. And yet in an effort further to promote safety and still push forward to new heights of achievement, research on the human side is going on all the time. We are continually striving for a better biological "yardstick" on which to determine the characteristics of the good pilot as well as the poor pilot. This is an important feature relating to safety and prolonging the usefulness of a pilot's carer. A number of university research staffs are still interested in this problem and are participating in the investigation along with federal agencies and the airlines themselves. In so far as judgment and other psychological considerations are concerned in the selection and maintenance of the flyer, it is much easier for the flight surgeon to put his finger on undesirable traits that ordinarily preclude, rather than to draw a pattern of psychological behavior predicting success in flying. However, in our original examination for flying we do attempt to appraise and assign a value to such factors in keeping with standard psycholcgical and other practices.

The airlines have a special interest in these selection safeguards and the early elimination of the unfit, for the reason that many of their pilots are recruited from the graduates of the Army and Navy and other training schools that look at their yard-sticks twice before placing the stamp of approval on their flying products. Thus the airlines know that the pilots who join from such training centers represent the survival of the fittest.

In the past few years I have been so situated as to see much of what proper selection means towards the promotion of safe flying. At Randolph Field, Texas, as the Commandant of the School of Aviation Medicine, I saw, in end-results, the shattering of hopes to seven out of eight flying aspirants. Now with an airline, I meet some of those who successfully negotiated the training course. I happen to know they deserved the wings they won. The vast majority of our airline pilots are men of the highest calibre—mentally, morally, physically, and in technical proficiency. A cross section of them as a group would reveal a fine specimen of manhood; to wit: a pilot who is ablebodied, intelligent, of good habits, and knows the meaning of discipline; a flyer who has a pleasing yet rugged personality; an aviator who is cherful, alert, energetic, and finds pleasure in his work; an airman who is trained; has good reaction time, good judgment, and no easily aroused emotional complexes. That embraces the type of men we now have flying our airliners. The country at large and the flying industry in particular need have no fear that our planes are not in the safest and ablest hands. In my opinion, better pilots could not be found anywhere.—*Mil. Surg.*

SIR FREDERICK BANTING

The recent death of Sir Frederick Grant Banting through an airplane accident in the wild lands of Newfoundland is one of the greatest losses medicine and science have suffered in many a year. Sir Frederick, knighted, and awarded the Nobel Prize bcause of his outstanding accomplishments along the lines of insulin research, is best known in medical circles for his epochal discovery of insulin as a therapeutic agent for diabetes. No longer is that disease the probable quivalent of a death sntence, more or less prolonged. Because of

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him the lives of an untold number of diabetic sufferrs have not only been relieved of many of the worst features of their malady but they have also ben lengthened and rendered not only endurable but inmany cases comfortable and even happy.

At the time of the fatal accident which caused his death, Banting was reported to have been on his way to Great Britain with secret military information about the science of aviation. After the outbreak of the war the Banting Institute Laboratory at Toronto was converted into a laboratory for research in aviation medicine. Sir Frederick was made chairman of the associate committe on aviation and he dvoted himself to this new line of medicine with all the energy, interest and efficiency which has marked all his endeavors. In a recent interview Dean C. J. Mackenzie, acting president of the National Research Council, is quoted as having said that Dr. Banting would go up in a plane as high as he could to discover the effect of the lack of oxygen on the pilot. "He would insist upon diving to see the ffect of dive bombing on the bomber crew. He did evrything a plane can do in the air in his study to discover means to counteract the heavy strains on humans in these unusual circumstances." The Dean explained that it was impossible to cite any details now about Banting's discoveries; "But when the time does come," he added, "and his contributions can be adequately assessed, it will be clear that no one has done more for our cause."

For a number of years several of the more original minds interested in medical science had been groping blindly but always with hope of finding the soluion of the problem as to just what was the relation of the pancreas to the assimilation of sugar taken into the system. Even before the World War, Dr. George Zuelzer, one of Germany's great scientists, had obtained some striking results in treating experimental diabetes with pancreatic extracts. These unfortunately had to be discontinued by their originator for the sake of researches into military medicine. Mering and Minkowski had already shown that when a dog is deprived of its pancreas it soon becomes diabetic and eventually succumbs to this malady. For years others had been experimenting and investigating upon the basis of an established theory that it is some function or condition in the pancreas which is necessary for the assimilation of sugar, and that without this organic agency, or if its action is in cal changes occur. But not one of these original minds apparently possessed the peculiar ability to descern relationships and their significance in regard to the problem as a whole.

And here Dr. Banting stepped in. He had that type of mind—the mind that can pick out the essential point, the significant fact, from all the findings, and build around it a structural whole

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1. Knight, F., and Shelanski, H. A., "Treatment of Acute Anterior Urethritis with Silver Picrate," Am. J. Syph., Gon. & Ven. Dis., 23, 201 (March), 1939.

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that demonstrates the relationship and the meaning of all the facts and findings, and leads them to a discerned goal supported by a more or less complete pattern.

This is how it happened. On October 30th, 1920, so the story goes, Frederick Banting happened to read in an article in a medical publication that the pancreas always degenerate when a duct from it is either tied or is blocked in any way, as from gallstones. It was then that his mind clicked and he saw what no one else had seen—a long vista of facts and findings leading to a definite conclusion. An entry in his note book for that very night reads: "Ligate pancreatic duct of dogs; wait six to eight weeks for degeneration; remove residue and extract."

Banting's mind was not the kind that has the vision, ses the goal, then waits for others to do the practica work. He had that rare combination of abilities—the ability to discriminate, to coordinate, to point his facts to the ssential purpose; he went even farther than that. His power of practical application was as great as his powers of theoretical reasoning and his inspiration. He succeeded in interesting some of his collaborators in the laboratory in the solution of his problem and its application to the therapy of diabetes. After further careful experimental and research work, a monograph which has become one of the mile-they gave their findings to the medical world in stones in medical progress. Among these collaborators wer, as is well known, Dr. C. H. Best, Dr. J. B. Collip and Professor J. J. R. MacLeod. It is also well known that, when Dr. Banting and Dr. Macleod were awarded the Nobel Prize, they divided their shares with their two fellow workers.

In an editorial in the New York Times that appeard shortly after the tragic accident which cost Frederick Banting his life and medical science one of its greatest living proponents, the writer sums up most appropriately and succinctly Sir Frederick's chief contribution to medicine: "It would be too much to say that Sir Frederick Grant Banting conquered diabetes, but there is no doubt that his discovery and application of insulin robbed the disease of its ancient terrors and made it possible for its victims to prolong their lives and to go about their work with much of their old energy. The annals of medicine contain no more thrilling tale than that of his long, patient following of clues that had been recorded in medical literature for decades . . . He fitted into architectural pattern that had meaning. And now a diagnosis of diabetes is no longer a sentence to early dath."—*Med. Record.*

THE A B C OF VITAMINS

A

Oh, fine and fat was Ralph the rat,
And his eye was a clear cold grey.
How mournful that he ate less fat
As day succeeded day.

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Till he found each cornea daily hornier,
Lacking its vitamin A.
"I missed my vitamin A, my dears",
That rat was heard to say.
'And you'll find your eyes will keratinize
If you miss your vitamin A".

B

Now polished rice is extremely nice
At a high suburban tea,
But Arbuthnot Lane remarks with pain
That it lacks all vitamin B,
And beri-beri is very, very
Hard on the nerves, says he.
"Oh take your vitamin B, my dears!"
I heard that surgeon say;
"If I hadn't been fed on standard bread
I shouldn't be here today".

C

The scurvy flew through the schooner's crew
As they sailed on an Arctic sea.
They were far from land and their food was canned,
So they got no vitamin C.
For "Devil's the use of orange juice",
The skipper 'ad said, said he.
They were victualled with pickled pork, my dears,
Those mariners bold and free,
Yet life's but brief on the best corned beef,
If you don't get vitamin C.

D

The epiphyses of Jemima's knees
Were a truly appalling sight;
For the rickets strikes whom it jolly well likes,
If the vitamin D's not right.
Though its plots we foil with our cod liver oil
Or our ultraviolet light.
So swallow your cod liver oil, my dears,
And big bonny babes you'll be.
Though it makes you sick it's a cure for the rickets
And teeming wtih vitamin D.

E

Now Vitamins D, and A B. C.
Will ensure that you're happy and strong;
But that's no use; you must reproduce
Or the race won't last for long.
So vitamin E is the stuff for me
And its praises end my song.
We'll double the birth rate yet, my dears,
If we all eat vitamin E.
We can blast the hopes of Maria Stopes
By taking it with our tea.

—St. Bartholomew's Hospital Journal—in McGill Med. Jo.

DIRECTORY OF MEDICAL SPECIALISTS 1942 EDITION

Specialists eligible for listing in the forthcoming second edition of the Directory of Medical Specialists are urged to fill in and return promptly the questionnaires for biographic data now being mailed out by the publication office.

This Directory is the official publication of the Advisory Board for Medical Specialties, issued every two years, and listings are limited to those formally certified by any of the fifteen American

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The second edition is now being prepared, and will be ready for distribution early in February, 1942, with biographic, geographic, and alphabetic listings of all diplomates certified to January 1, 1942. It will include approximately 18,000 names.

The Directing Editor is Paul Titus, M.D., 1015 Highland Building, Pittsburgh, Pennsylvania, and the secretaries of the fifteenth American Boards constitute the Editorial Board.

DEATH AND A COUNTRY DOCTOR

(D. C. L.)

In Memoriam

His life was long and full of selfless hours;
Most of the arts of healing did he know;
Yet latest turns of science he was slow
To try on those he called "My Wilted Flowers."

Each death to him was bitter as defeat—
He spoke but once in public and he failed;
His subject St. Mihiel, he first detailed
The great maneuver and the foes' retreat . . .

Then something else he thought and fain would say:
In different mien he talked of trampled grain
And star-strewn sleeping figures done with pain—
Again, again he tried and turned away.

—

One night a glare of lights—a crashing van
Pins him beneath his wheel—as those at hand
Withdraw his mangled form, his last command,
"Quick with my bags! I must have hurt a man!"

—*J. A. A. Med. Coll.*

DIFFERENTIAL DIAGNOSIS OF ANGINA PECTORIS AND THE PAIN OF MYOCARDIAL INFARCTION

	Angina Pectoris	*Coronary Thrombosis*
Onset	During exertion	Usually during rest or sleep
Attitude	Immobile	Restive; may walk about
Site of pain	Sternum to arm	Sternum or lower
Duration	Minutes	Hours or days
Dyspnea	Absent	Usually severe
Vomiting	Rare	Common
Shock	Absent	Present
Sweating	Slight	Severe
Facies	Normal	Ashen pallor
Pulse	Unchanged	Feebl, often rapid
Temperature	Unchanged	Subnormal, then febrile
Blood pressure	Unchanged or raised	Lowered
Heart failure	Absent	Often follows
Heart sounds	Unchanged	Gallop rhythm, friction
Leukocytosis	Absent	Present
Electrocardiogram	May be abnormal	Often Diagnostic
Action of nitrites	Often relieved	No relief

—*Jour. M. S. M. S.*

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"OUR SOLEMN ASSURANCE . . ."

The following resolution was adopted by the Committee on Resolutions of the State Medical Society at its 99th anniversary meeting in Milwaukee, September, 1940:

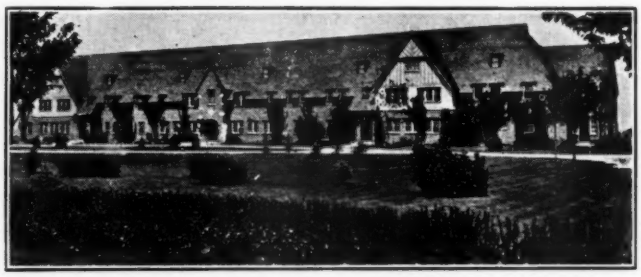
WHEREAS, Our national government has found it expedient to register all men between the ages of 21 and 35, and

WHEREAS, Cognizant of the existing emergency and in full accord with our government, and realizing that the sacrifices of all mobilized men will necessarily extend into the economic field, and

WHEREAS, A great number of the members of our profession will unquestionably be inducted into service; be it

Resolved, That we as members of the State Medical Society of Wisconsin in a spirit of patriotic duty, here and now give to each colleague who may be conscript or who may volunteer, our solemn assurance that we will do everything within our power to protect his practice and preesrve it for him during his absence from the community.—Presented by Dr. R. E. Fitzgerald, chairman, M-Day Committee (seconded by Dr. J. F. Smith, Wausau; carried).—*Wisc. Med. Jo.*

Founded 1896 by Dr. Hubert Work



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BOOK NOTES

HEMORRHAGIC DISEASES: PHOTO-ELECTRIC STUDY OF BLOOD COAGULABILITY. By Kaare K. Nygaard, M. D. Former Fellow in Surgery, the Mayo Foundation: Former Assistant Surgeon, the University Clinic, Oslo; Fellow of the Alexander Malthe Foundation for Research in Medicine, Surgery and Gynecology. Cloth. Pp. 320, with illustrations. St. Louis: C. V. Mosby Co., 1941. Price $5.50.

This is a very interesting monograph divided into three parts. The first part previews the present methods of determining the coagulability of the blood and enters into the general considerations of the photo-electric principle, photelgraph, physical and physiological considerations of the photelgraphic tracings (coagelgrams) together with interpretations and readings of the coagelgrams. Part Two presents a general review of various experimental findings concerning the coagulability of blood, the interaction of thrombin and fibrinogen, and the coagulent effect of thromboplastin, with particular reference to the quantitative estimation of prothrombin. Part Three deals with the clinical aspects of hemorrhagic diseases with special reference to hemophilia, thrombocytopenic purpura, vitamin K and hemorrhagic disease of the new-born.

The academic aspects of this book are simple to understand and certainly we can look forward to the application of the photo-electric cell principle to an ever increasing number of uses in the laboratory. Dr. Nygaard explains this principle and its use in determining coagulability of blood. Part Three will be of most interest to both the internist and the surgeon for its clinical interpretations using the new method of determining blood coagulability. —*V. M. R.*

BOWLING

Plans are on foot to have a bowling tournament during the next meeting of the American Medical Association. It is hoped that teams can be formed representing various states. Physicians who are interested in bowling should contact Dr. Lewis W. Bremerman, 1709 West 8th Street, Los Angeles, California.

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